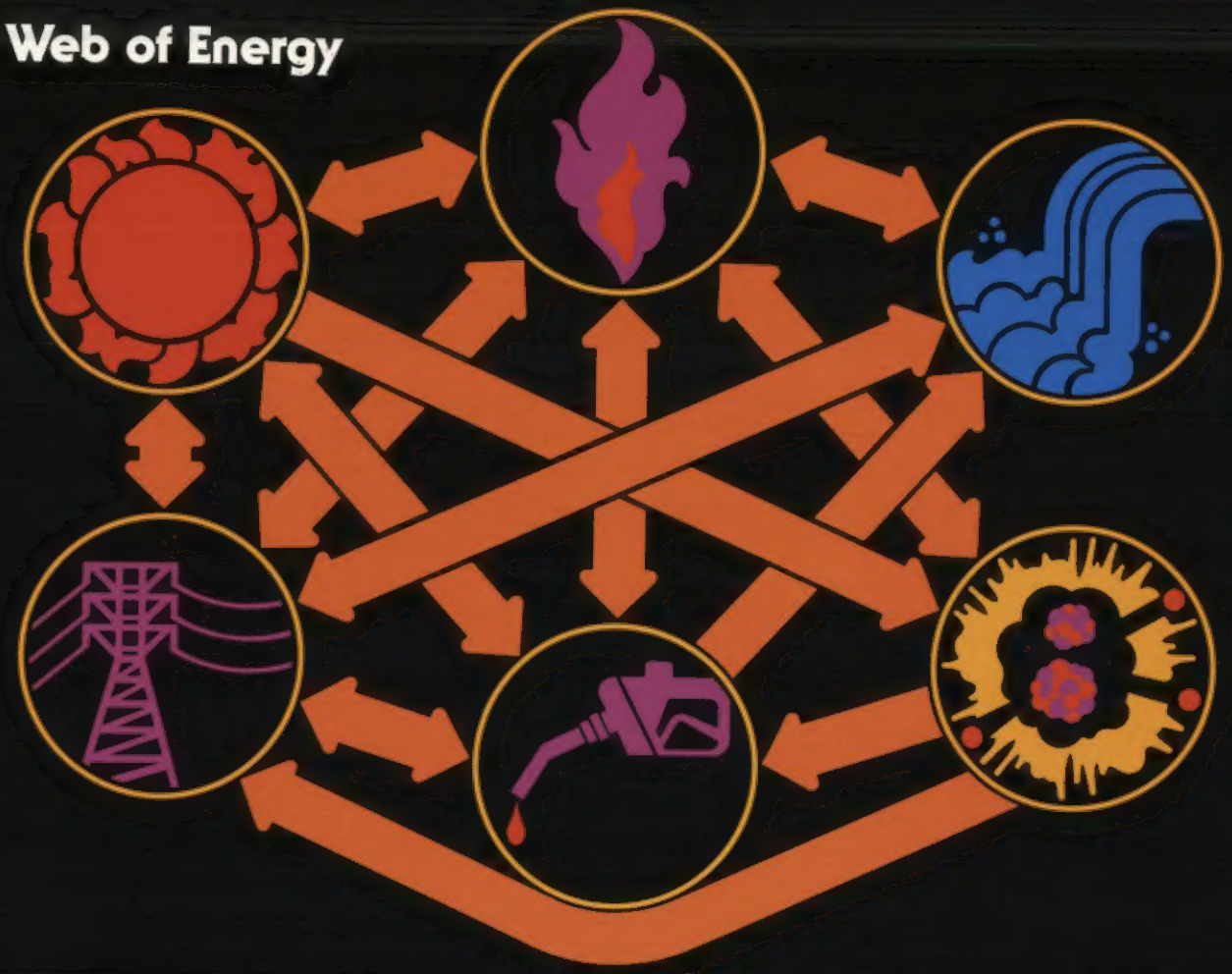
Teledyne Report

For the Year 1979

Energy: Fueling Spaceship Earth for the Eighties

The Web of Energy



We live in, depend upon and are part of an intricate web of energy that exists in many forms. Energy can be converted from one form to another, and is the most basic resource that makes life possible on this planet.

The word energy comes from a Greek word that means work. Thomas Young first used the word in a scientific sense in 1807. To the physicist, energy is the ability or capacity to do work.

Work, in turn, has been defined as the application of force to an object which moves it through a given distance. A man or water wheel or engine that hoists a one-pound weight at the end of a rope to a height of 100 feet have each done one hundred foot-pounds of work. If the weight had weighed 100 pounds and had been hoisted only one foot, the same amount of work would have been performed.

Power, the third word commonly used by the physicist in talking about energy matters, is the rate at which work is performed. If the engine just mentioned could lift the weight in one second, while it took the man ten seconds, the engine could be said to have ten times the power capacity. One horsepower is defined as the ability to do 550 foot-pounds of work in one second.

Energy abounds in the universe and on earth in many forms—mechanical, chemical, heat, light, nuclear, and electrical, according to one commonly used breakdown.

Mechanical energy is embodied in any mass that is raised above the surface of the earth. This could be water in a high mountain lake, or the weight on a grandfather clock when it is raised to its highest position. As long as the mass is at rest its energy is potential and no work is done. When the clock weight begins to move downward and turn the clock mechanism, or when the lake water flows down through the penstock of a hydroelectric installation and turns a water turbine, each gives up its potential energy and performs work.

Chemical energy is embodied in all the common fuels we use. Wood, coal, petroleum products, natural gas and other fuels give off heat—perhaps the most useful form that energy takes—when they are burned. This is a chemical reaction that allows the carbon and hydrogen bound up in the molecules of these fuels to combine with the oxygen in the air with the release of heat.

Energy in the form of heat can be used to warm our dwellings, to raise the temperature of water, to cook foods or to support all types of industrial processes from melting steel and glass to drying soybeans. One of the most important uses of heat energy derived from chemical sources is to drive the engines that move our automobiles, airplanes, ships, trains and industrial machinery. These engines, gasoline and diesel reciprocating engines, as well as steam and gas turbines, are all known as heat engines to the physicist because they derive their power from heat that expands gases to exert force on pistons or turbine blades to produce useful mechanical energy.

Energy also exists in the form of nuclear forces that bind the structure of atoms together. This energy can be released as heat in the process of nuclear fission when certain atoms are split as they are in commercial nuclear power reactors. Nuclear fusion, which occurs when atoms of hydrogen combine to form helium, also releases tremendous amounts of energy. This reaction is the source of the heat generated by the sun and other stars. Because of the extremely high temperatures that must be achieved to sustain this reaction—far higher than any known material can withstand—a controlled release of any useful amount of energy from this source has not yet been realized.

Electricity is another useful form that energy can take. Energy can be converted into electricity directly from several of its other states, but commercially it is produced from mechanical energy turning large rotary electrical generators. Electricity is one of the most convenient forms of energy because it can be transmitted for great distances over electrical wires, and it can be easily controlled and converted into other forms such as light, heat, mechanical and chemical energy. Its one drawback is that it cannot be stored easily in any great quantity.

Light and all other electromagnetic radiation, a form that energy frequently takes, might seem insignificant in terms of our use of it here on earth, yet it is perhaps the most essential form to life. The radiant energy from the sun, including light and heat in its radiant form, which falls on the earth in fifteen minutes equals the total amount of energy used by man in one year. This energy keeps our world at a habitable temperature, grows plant life that is the source of all our fossil and bio fuels as well as our food, creates the earth's winds, and evaporates the water that becomes rain to feed streams for hydroelectric power, among its many other effects.

Energy for the Eighties

Solving the problems of stretching dwindling energy resources to meet growing energy needs will most certainly be one of the principal concerns of the next decade. Fortunately there are many options.

It is unlikely, considering the means within our grasp at the present time, that the worldwide shortage of energy will be alleviated by any single, dramatic solution in the near future. Fusion power, which holds the promise of being able to supply all the world's energy needs for thousands of years, may take decades to perfect if it ever becomes feasible at all. Solar energy, while it already can supply domestic heat and hot water on a modest scale, will take years of engineering development before it can begin to make the huge contribution necessary to relieve the pressure on oil, coal and nuclear sources.

Instead of one grand solution, it is more likely that many smaller, short-term efforts taken together will help us meet our energy needs without seriously lowering the standard of living, or compromising the industrial and economic health of the world. These efforts will include seeking out new sources of conventional fuels, developing more efficient methods of extracting them, making the machines and devices that use fuel more efficient so that we get more work from every ounce of fuel we use, conserving fuel through wiser use of it, and most certainly, exploring, researching and engineering the more unconventional energy sources that show promise.

On the Cover: This view of the earth floating alone in space emphasizes the limits of its resources—not the least of which is energy.

A great many Teledyne companies are directly involved in the business of finding, developing, extracting, converting, distributing and utilizing energy in its many forms. Other Teledyne companies are second tier suppliers of materials, products and services that are vital to these energy oriented pursuits. Many of their activities have been discussed in detail in Teledyne Reports that have been published in the last ten years. This Report, the final one for the decade of the seventies, is an attempt to bring together the most significant of these energy-related activities and show Teledyne's deep involvement in the issues that will undoubtedly be paramount in the coming decade and beyond.

ENERGY IS WHERE YOU FIND IT

Over ninety percent of the energy needs of the United States are met with fossil fuels—petroleum liquids, natural gas and coal. As the known reserves of the two most easily utilized and presently most important fuels—petroleum and natural gas—are depleted, an intensive effort is being made on a worldwide basis to discover new deposits. Many of these searches are taking place in remote regions of the world that have never been thoroughly explored. One of the first requirements in this search is the development of accurate maps of these regions.

Teledyne Geotronics has used aerial mapping, geodetic surveying, photogram-

metry and computer processing techiques to carry out thousands of miles of surveys throughout the world, in such places as Africa, Asia, Australia, the Middle East and South America, as well as on the North American continent. Many of these surveys have been useful in primary exploration for petroleum and mineral resources. Others have been made for specific energy projects such as the aerial survey and mapping done for the 800-mile route of the Trans Alaska Pipeline, and surveys used to develop routes for long distance electrical transmission lines and gas and oil pipelines.

Teledyne's oldest company, Teledyne Gurley, is in the closely related field of manufacturing surveying instruments — transits, theodolites, levels and alidades that were used in the early exploration of the United States and are still used today in many of the ground surveys and construction projects related to petroleum production and other energy activities. The company's precision optical encoders have also been used to develop an electronic digital sextant that provides direct digital angular data to shipboard computers during hydrographic surveys of offshore areas.

SEEING BENEATH THE EARTH

Seismic surveying is the most widely used method of determining the likelihood of finding oil or gas resources beneath the earth's surface or sea bottom. With this method a pulse of acoustic energy is sent into the ground or sea bottom, and the echoes that are reflected back from the various strata in the earth are detected and recorded. Computer analysis of these reflections permits a visual cross section of the earth's strata to be created, from which likely locations for oil deposits can be deduced.

Teledyne Exploration has been active in the acquisition, processing and interpretation of seismic geophysical data for more than 40 years as a service to the petroleum and mining industries and to governmental agencies. During the past ten years land geophysical surveys have been carried out in North, South and Central America, Africa and Australia. Marine surveys have been conducted off North and South America, Europe, Africa, Australia and Indonesia.

Over half of Teledyne Exploration's land geophysical crews work in the United States. Teledyne's land seismic operations include some crews using dynamite in shot holes and some with surface acoustic sources. Teledyne's Vibroseis experience is outstanding, with over 120 crew-years of operation. Conventional and shear-wave Vibroseis equipment is currently being used by over a dozen Teledyne crews.

During the past 15 years, Teledyne Exploration has acquired over 10,000 miles of company-owned seismograph surveys on land. Copies of these have been sold widely to oil and gas industry customers on a non-exclusive confidential basis.

The company's first marine seismic survey in 1934 resulted in the discovery of a new oil field. Since that time over 200,000 miles of marine geophysical surveys have been carried out, and a proprietary library of 165,000 miles of marine surveys of various parts of the world is available for sale to oil industry customers on a non-exclusive basis for use in their search for hydrocarbons. Custom surveys are also made on a contract basis for the exclusive use of the customer.

Through the years, Teledyne Exploration developed sophisticated equipment for marine seismic surveying including electrical discharge acoustic sources, hydrophones, geophysical cables and cable depth indicators and readout systems, and now manufactures and sells this equipment on the commercial market.

Teledyne Mecca, a producer of plastic injection and elastomer molded products, also makes seismic cables and various types of interconnecting cables for pattern spread surveys for oil exploration. A related line of high pressure electrical feedthrough connectors is used by the petroleum industry in electric logging of oil wells. Mounted on tools that are exposed to working pressures and temperatures within an oil well, these connectors are able to withstand pressures up to 20,000 pounds per square inch, and temperatures to 500°F.

MARKING THE EXACT SPOT

Offshore drilling and construction activities require the ability to locate positions precisely on the open sea where shoreline landmarks are not visible. This is necessary so that offshore platforms can be positioned properly on the specific oil company lease, and so that the desired geologic formation can be located for drilling. Teledyne Hastings-Raydist developed and manufactures a proprietary radio navigation and positioning system known as Raydist. It permits a vessel carrying a Raydist receiver

to locate its position within ten feet at ranges of up to 250 miles from a set of land-based transmitters. Raydist is extensively used by governmental agencies for hydrographic surveying and by private industry in offshore oil operations.

GETTING THE OIL OUT

Nearly half the remaining U.S. resources of oil are believed to lie under offshore waters. Extracting this oil is difficult and costly. Teledyne Movible Offshore provides offshore drilling and construction services to major oil companies on a contract basis. These services cover the entire spectrum from exploratory drilling in search of new oil, to removal of facilities from abandoned production areas.

The company's construction division specializes in the design, fabrication, transportation and installation of offshore drilling platforms and other structures. Facilities and equipment include a fabrication yard, a 40-ton crane vessel, a 150-ton derrick barge, a launch barge, cargo barges and a 650/800-ton derrick barge.

Drilling equipment consists of two submersible drilling rigs, three self-contained platform drilling rigs, three self-contained platform workover rigs, and four 250 foot jack-up rigs. The rigs are capable of drilling to depths of 25,000 feet in water depths of up to 250 feet.

PIPE FOR PLATFORMS

The steel tubular members used to fabricate offshore platforms are produced by two Teledyne companies. Teledyne Irby Steel produces high quality rolled and welded steel tubulars primarily for the offshore industry. The company has the capability of forming steel plate over nine inches thick. Plates can be formed in diameters of from two to fourteen feet, and furnished in lengths of over 300 feet. Single piece tubulars over 300 feet long and weighing over 300 tons have been produced.

Teledyne Pipe also produces rolled and welded tubular goods in somewhat smaller sizes. Diameters of twenty inches to twelve feet are produced in wall thicknesses from one quarter inch to four inches. Some of this product is also used in offshore oil construction, but much of it is also used in other energy-related applications such as refineries and power plants.

A great deal of high pressure pipe is used by the oil industry for oil production tubing and well casing that is sunk deep into the ground. Teledyne Landis Machine is a major supplier of threading machines and tools used to produce the exacting American Petroleum Institute threads used on oil tubular pipe and couplings in the oil fields. Threads on oil well casing up to 20 inches in diameter are largely produced on Teledyne Landis receding chaser pipe threading machines. A variety of other Landis equipment is used for threading smaller oil well tubing, couplings and valves.

GETTING MORE FROM EXISTING OIL WELLS

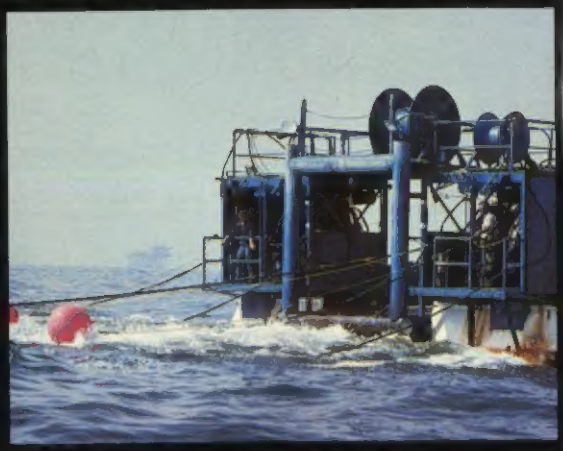
Oil wells are not created equal. Some wells flow naturally from high underground pressures while others must be pumped from the very start. Teledyne Merla specializes in equipment and methods for increasing the production and operating efficiency of both of these types of wells. This very specialized field of technology, called "gas lift," involves injecting high pressure gas into the wells under carefully controlled conditions. The equipment involved—gas lift valves, sidepocket mandrels and related controls—are manufactured by Teledyne Merla to the highest standards of precision and reliability. Much of this equipment must operate for long periods of time at depths of thousands of feet in the ground where maintenance and adjustments are not possible.

To insure that the maximum production and efficiency are achieved for each well, Teledyne Merla's computer programs are used to pinpoint the flowing characteristics of a well, design the gas lift installation and even aid in troubleshooting problems with an existing installation.

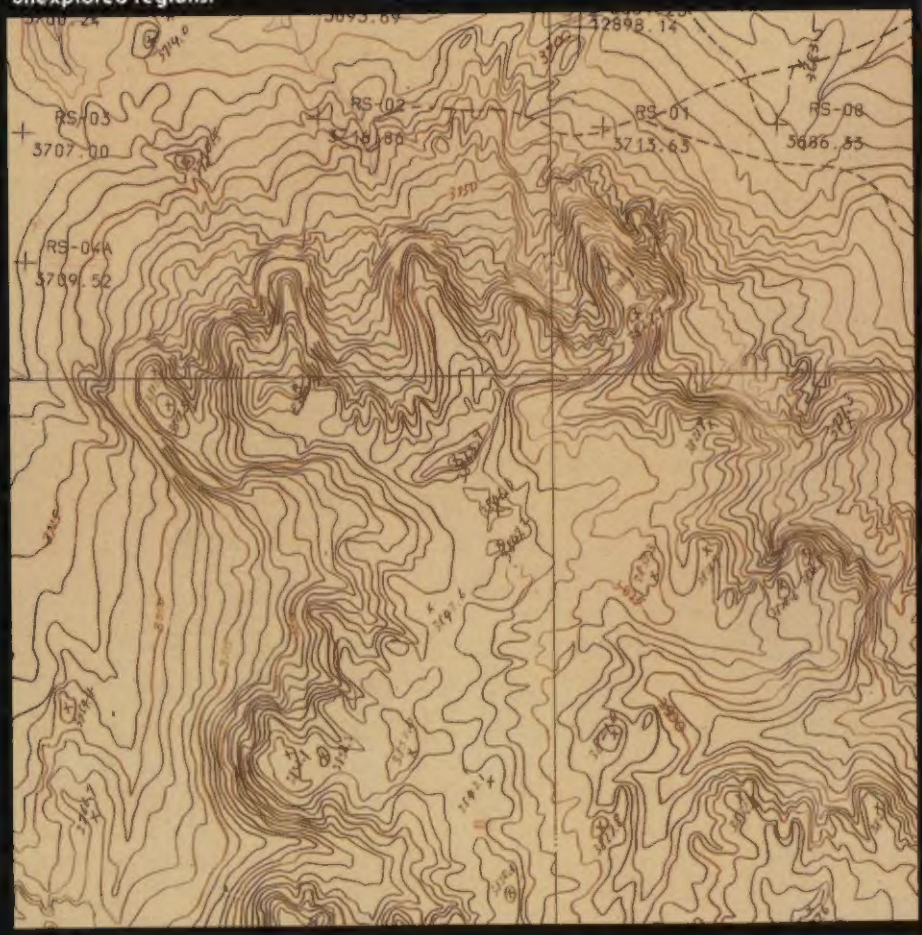
Teledyne Merla also manufactures control valves for regulating oil, water and gas flow, safety valves for automatically closing wells when an unsafe condition exists, and controls used in regulating these valves. Related to these products is a line of flameless catalytic heaters that are extensively used in the oil industry to prevent control valves from freezing as well as to provide heat for instruments and personnel.

Even with pumping and gas lift techniques only about one third of the oil in the ground can be recovered. Secondary and tertiary recovery techniques have been developed to increase this yield up to 40 to 60 percent of the total reservoir content. Water or gas flooding involves injecting either of those fluids into the formation

Hundreds of thousands of miles of seismic surveys of the ocean sub-bottom have been carried out by Teledyne Exploration in the search for sub-sea oil.



Teledyne Geotronics' precise aerial photography and photogrammetric techniques quickly provide oil exploration crews with detailed maps of unexplored regions.

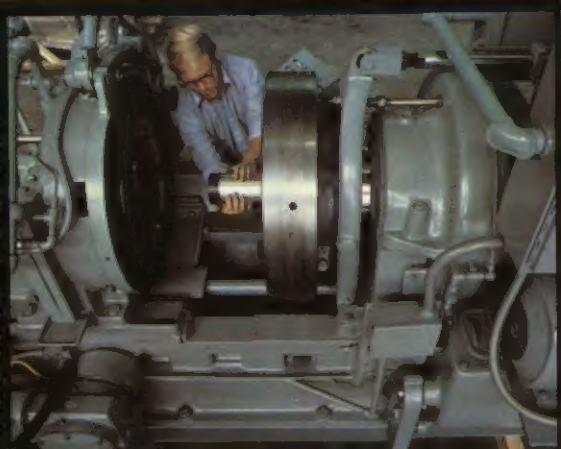


adio-positioning systems eveloped by Teledyne Hastings-Raydist inpoint exact locations on the open seas or offshore drilling and construction.

eledyne Movible Offshore's 650/800-ton derrick barge is used in onstructing and emplacing offshore oil production platforms.

Right: Threading machines built by Teledyne Landis are widely used in the oil industry to produce the exacting American Petroleum Institute threads used on high-pressure oil well tubing and couplings.

Right Center: Computer-based supervisory systems built by Teledyne Geotech are used to control huge networks of equipment that comprise transcontinental gas and oil pipelines.

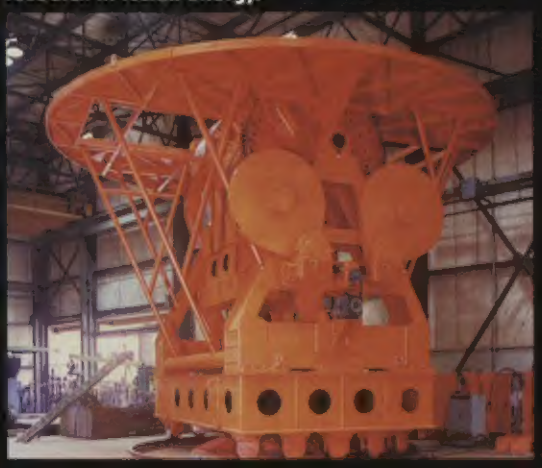


Below Center: Gas lift valves produced by Teledyne Merla, such as this one undergoing calibration, are used to increase the production flow of oil wells.

Tubular steel members used in fabricating offshore oil platforms are produced by Teledyne Irby Steel in diameters to 14 feet and lengths of 300 feet or more.

Below Center: Teledyne Farris Engineering's line of spring-loaded and pilot-operated pressure relief valves are widely used in the oil production, refinery and electrical power generation industries.

This huge coil winder produced by Teledyne Readco is used by the Lawrence Livermore Laboratory to wind superconductive magnet coils for research in fusion energy.



Thermoluminescent dosimeters that measure exposure of personnel to radiation are provided to the nuclear power industry by Teledyne Isotopes.

through surrounding wells, to drive the oil toward the producing wells. Control valves, both surface and subsurface, used in controlling this flooding are also manufactured by Teledyne Merla.

The flooding process can be expensive, however, and may not be economically successful unless there is a thorough understanding of what is taking place in the reservoir. Teledyne Isotopes provides the oil industry with radioactive tracer materials that can be injected into the formation with the flooding fluid and later detected in extreme dilutions when they appear in the production well fluid. Petroleum engineers can thus trace the progress of the drive fluid from various wells and control the effectiveness of the flooding process.

GETTING THE PRODUCT TO MARKET

Pipelines have proved to be one of the most efficient methods of getting the produced natural gas and crude petroleum to where they are needed. In 1978 an estimated 20 trillion cubic feet of natural gas was conveyed across the United States through a network of more than a quarter million miles of large diameter gas pipelines. A similar network of over 160,000 miles of liquid pipelines carried billions of barrels of crude oil and other petroleum liquids. These pipelines represent incredibly complex machines with large engine driven compressor or pump stations dotted along their length, sensors that monitor temperatures, pressures and safety conditions, and metering instruments that measure the amount of product flowing past given points. Teledyne Geotech is a major developer and producer of Supervisory Control and Data Acquisition or SCADA systems that permit these huge networks to be controlled efficiently and accurately from central computer installations. A pioneer in instrumentation and control systems with experience going back to 1936, Teledyne Geotech was the first in the industry to introduce remote terminal equipment for SCADA systems utilizing "computer-on-a-chip" microprocessor technology, and continues to be an innovator in this field today. In the development of advanced SCADA systems, the company has developed related subsystems that include compressor engine controls, automatic compensated liquid measurement systems, and gas flow calculators.

REFINERIES AND POWER PLANTS

A great many Teledyne products and services are also used by the refining and electrical power generation industries. Teledyne Engineering Services, for example, is involved at the very beginning in the design and analysis of pumps, piping, pressure vessels, valves, storage tanks and other structures used in refineries, power plants (both conventional and nuclear fueled) and facilities for liquefied natural gas (LNG). Computer analysis is used for much of this work and facilities are available for the measurement of physical properties and the testing of materials and structures.

Many of the basic materials used in constructing plants of this type are supplied by Teledyne. Rolled and welded pipe of many sizes is provided for low and high pressure use in various wall thicknesses by Teledyne Pipe. Teledyne Ohiocast specializes in centrifugally cast pipe and cast fittings for high temperature, high pressure applications where high corrosion resistance is necessary. Teledyne McKay welding alloys in electrode and wire form are widely used in the construction of power plants and refineries. Hardsurfacing, applied with Teledyne McKay hardsurfacing welding alloys, is also used to extend the life of machinery used in the handling of abrasive materials such as coal.

More exotic materials such as nickel-base and titanium alloys made by Teledyne Allvac are used in manufacturing high temperature parts for land-based gas and steam turbines that generate electrical power, as well as in nuclear power reactors, breeder reactors and oil and gas production equipment. The exceptional corrosion resistance of titanium has made it an important material in petrochemical installations and in power plant cooling towers, especially where brackish or sea water must be used.

Thin metals produced by Teledyne Rodney Metals in stainless steel and other exotic alloys are used in refinery and power plant heat exchangers, and in the form of thin foils for nuclear power plant insulation. Special etched wafers of stainless steel are also used in filters that can remove particles of less than micron size from the water in nuclear power plants.

Teledyne Wah Chang Albany is a leading world supplier of zirconium and hafnium metals. Zirconium is used in cladding the fuel rods in nuclear reactors and for other reactor parts because of its transparency to neutrons. Hafnium, because of its neutron

absorbing characteristics can be used for control rods that moderate the nuclear reaction. Zirconium, because of its exceptional corrosion resistance is also widely used in the petrochemical industry.

Columbium (also called niobium), another exotic metal produced by Teledyne Wah Chang Albany, is vital in the field of superconductivity. Certain alloys of columbium with titanium lose virtually all resistance to the flow of electricity when they are cooled to temperatures near absolute zero. The company has supplied these alloys to contractors who manufactured the electric cables used in the highly efficient electromagnets built for the MFTF (Mirror Fusion Test Facility) at Lawrence Livermore Laboratory. This laboratory is one of the foremost fusion research facilities in the world.

Superconductive alloys also promise to make possible far more efficient electrical generators and motors, and may, one day, make possible the transmission of electrical energy over long distances with virtually no loss of energy from electrical resistance.

Other Teledyne companies are directly involved in building structures for the energy industry. Teledyne Brown Engineering, for example, designs and fabricates large welded steel structures for the nuclear power industry. Teledyne Readco builds welding positioners that are among the largest machines of their type in the world. These immense devices are capable of holding an object weighing up to 450 tons, and tilting, rotating or otherwise positioning it for automatic welding operations. They are used for cladding the interiors of power reactor vessels with stainless steel alloys.

Teledyne Readco also recently completed what is believed to be the largest coil winder ever built. Weighing some 170 tons, the machine was installed at Lawrence Livermore Laboratory where it is used to wind baseball type superconductive magnet coils for research in fusion energy.

INSTRUMENTATION AND CONTROLS

Refineries and power plants alike require a tremendous amount of instrumentation for safe and efficient operation. Combustion efficiency in boilers that generate process steam for refineries, or steam to run turbines in power generating plants is vital to conserving energy in these operations. An exact amount of oxygen is required to burn a given amount of fuel. Too little and unburned fuel is wasted and a safety hazard exists. Too much and heat is carried out the exhaust stack by the excess air and wasted. As a general rule, a reduction of one percent in flue gas oxygen content is equivalent to about a one percent saving in fuel. Teledyne Analytical Instruments makes flue gas analyzers that measure the precise content of oxygen, carbon monoxide and carbon dioxide in the flue gas. These monitors enable plant operators to control excess oxygen precisely for maximum efficiency and safety.

Instruments for measuring parts per billion of dissolved oxygen in the boiler return condensate water of large steam generating plants are also made. At the high operating temperatures and pressures of these plants even minute amounts of dissolved oxygen can cause rapid and extensive corrosion of the system and subsequent downtime and inefficiency. A variety of other instruments are made for use in the refinery and power plant industry and many are used to prevent the release of pollutants into the environment.

Gas flow probes for reliable measurement of gas velocity in stacks, mass flowmeters and vacuum measuring instruments made by Teledyne Hastings-Raydist also find specialized use in refining and power facilities.

A variety of instrumentation and services is provided to the nuclear power industry by Teledyne Isotopes. Services include environmental monitoring, measurement of the radioactive content of material samples, and determination of the precise radioisotope content of nuclear fuel materials. Thermoluminescent dosimeter equipment for measuring the exposure of personnel to radiation includes a complete line of dosimeters, readers and accessories for the protection of personnel.

Monitoring and control panels for electrical power generation plants are made by Teledyne Lewisburg.

FLUID CONTROL DEVICES

Refining and energy production involve the complex utilization of steam, gases and liquids often under high pressure and at high temperatures. Three Teledyne companies provide control and safety devices that are widely used in these industries. Pressure relief valves are very important in these systems to prevent dangerous overpressure and possible bursting of the system. Teledyne Farris Engineering makes a

Teledyne Engineering Services carries out design, analysis and testing of equipment for energy-related installations such as this unloading facility for liquefied natural gas.

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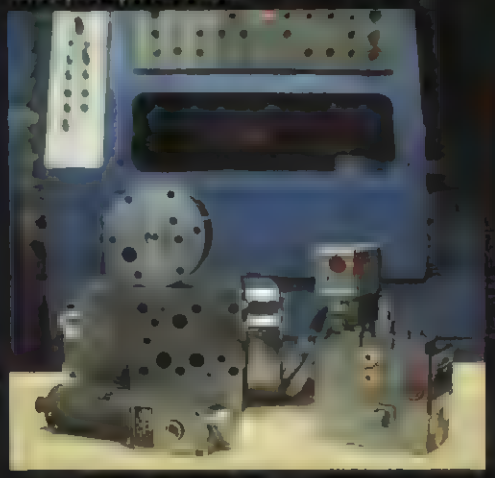
Tungsten carbide drill bit inserts and related equipment used in mining coal and other minerals are made by Teledyne Canada. Teledyne Firth Sterling also makes carbide products for mining and oil well drilling.

Many of the high-temperature parts used in land-based gas and steam turbines that generate electrical power are made with superalloys produced by Teledyne Allvac.

Instruments that save energy by assuring maximum combustion efficiency in power generating plants and refineries are produced by Teledyne Analytical Instruments.

Sophisticated valves and actuators used to control large steam and gas power generating turbines are manufactured by Teledyne Hydro-Power.



Above Left: This solar collector, half the size of a football field, was developed by Teledyne Brown Engineering to supply heat for soybean drying. It saves an estimated 25,000 gallons of fuel oil each year.

This resource recovery facility, designed and managed by Teledyne National, recovers and recycles useful materials from urban waste and turns combustible materials into useful fuels.

Direct conversion of heat to electricity without moving parts is accomplished by Teledyne Energy Systems's thermoelectric generators. This propane-fueled model is used to supply electricity to remote land-based instruments.

complete range of both spring loaded and pilot operated pressure relief valves for the energy industry, from small ones that can be held in one hand, up to giants that are eleven feet tall and weigh 8,500 pounds.

Teledyne Hydra-Power makes sophisticated valves and actuators used to control large steam or gas power generating turbines. Teledyne Republic Manufacturing's line of LoTorq rotary, and Exectrol linear control valves are used throughout the energy industries for zero leakage safety shutdown to control hydraulic pressures ranging from 6,000 to 10,000 PSI. Both of these companies also make a line of high-reliability solenoid controlled valves that are used in sub-sea applications by the offshore oil industry.

ELECTRICAL PRODUCTS

Electrical equipment for refineries and power plants is also made by Teledyne companies. Teledyne Penn-Union manufactures quality electrical connectors and related accessories. Products include electrical distribution connectors for overhead and underground utility construction, substation connectors, grounding clamps, flexible braid, terminal lugs and splices and terminal blocks. Some of the large connectors weigh over a hundred pounds.

Teledyne Crittenden supplies electrostatic precipitator products that are used on electric power generating plants by all major utilities, and by petroleum refineries. These devices produce high voltage electricity to remove particulate matter from the combustion products so they are not released to the atmosphere.

HANDLING WASTES

The problem of handling radioactive wastes from nuclear power generation sources is a continuing one. One of Teledyne Energy Systems' activities is the production of a waste solidification system that uses a form of water soluble polymer, urea formaldehyde, to safely bind aqueous solutions and slurries of radioactive waste into solids suitable for transport and disposal. Protective overpacks, designed to act as a combination shock absorber and insulator during shipment of wastes, and reusable lead-shielded transport containers with steel inner and outer lining are also produced.

Nuclear Engineering Company has more than twenty years experience in the transportation and disposal of low-level radioactive and hazardous chemical wastes.

OTHER ENERGY SOURCES

Some Teledyne activities are also related to energy sources other than petroleum. Tungsten carbide drill bit inserts made by Teledyne Firth Sterling and Teledyne Canada are used in drilling for oil and in mining uranium, coal and other minerals. Teledyne Canada also manufactures a variety of other mining equipment including rock drill parts, pneumatic and hydraulic cylinders, diesel powered mobile underground mining vehicles, blast hole loaders and hydraulic rock breakers. Hardsurfacing welding wire and electrodes made by Teledyne Canada and Teledyne McKay are used to increase the wear life of equipment used in crushing and transporting uranium ore, coal and other abrasive materials.

SOLAR ENERGY

In the area of more exotic energy sources, Teledyne Brown Engineering has designed one of the world's largest industrial solar collector systems—covering an area almost half the size of a football field — as part of a pilot program sponsored by the U.S. Department of Energy. Completed in May 1978, the 10,000 square foot collector array heats air to temperatures of up to 180°F to supplement fuel oil or natural gas energy used in drying soybeans at a large Alabama industrial facility. The system is designed to produce about 3.7 billion Btu's of heat energy annually, saving an equivalent of 25,000 gallons of fuel oil.

Teledyne Metal Forming is presently roll-forming three special shapes, two in copper sheet and one in stainless steel, on a production basis for a manufacturer of commercial solar collectors. These liquid-medium collectors are off-the-shelf items suitable for use in residential or commercial solar energy systems for space heating or water heating. The roll-forming technique of manufacturing parts for these devices offers advantages both in the fabrication and performance of the collectors.

HYDROGEN

Hydrogen combines with oxygen by burning to produce heat and water. But because hydrogen is not found in free pure form anywhere on earth it cannot be considered an energy source. However, hydrogen can be made by chemical or electrical means, and

can be employed as a very useful energy storage medium and as a fuel where clean burning without noxious combustion products is desirable. Teledyne Energy Systems manufactures electrolytic hydrogen generating equipment that uses electric power to separate water into its constituent parts, hydrogen and oxygen. These units are used to supply hydrogen to industrial and laboratory users of the gas. Hydrogen promises to play an important role in the future as a method of storing and transporting energy.

THERMOELECTRICS

Another unusual product of Teledyne Energy Systems is its line of thermoelectric generators. These devices can convert heat directly into electricity without any moving machinery. At present practical only on a comparatively small scale because of the cost of the equipment, these generators are nevertheless widely used to generate moderate amounts of electrical power on a continuous basis in remote locations. The source of heat makes no difference to these devices, and they have been built to run on propane, butane, natural gas, and for special situations such as satellites and space probes, on the heat from nuclear isotope sources.

ENERGY FROM WASTE

Our society throws away, literally, the energy equivalent of millions of barrels of oil each year. This energy is in the form of so-called waste. Teledyne National specializes in the design and management of plants that recover useful resources and energy from urban waste. At the present time the company is managing a number of these projects in the United States. By utilizing the combustibles in refuse as fuel, the usable energy from these projects alone is the equivalent of 2.75 million barrels of oil per year. Such an amount could furnish enough gasoline for the yearly needs of 145,000 automobiles. Furthermore, by recovering and recycling such materials as steel, aluminum and glass the equivalent of another half million barrels of oil per year is saved. This is because it takes less energy to make steel, aluminum and glass products from recycled materials than from raw materials.

These Teledyne managed projects deliver energy in different forms. One produces pellets of refuse fuel which substitute for coal in small boilers. Another project generates steam for a downtown heating district serving stores, factories, hospitals, and a university. Other projects produce steam and electricity for industrial use and generate electricity for utilities.

Virtually every medium to large municipality is keenly interested in this refuse-to-energy concept because it helps to address two very urgent needs of today—the development of alternate energy sources, and the development of more satisfactory methods of refuse disposal.

ENERGY—CONSERVING WHAT WE HAVE

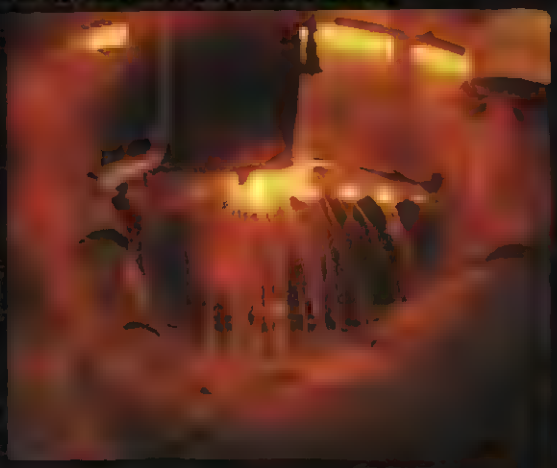
Machinery, tools, materials and techniques for finding, recovering, converting and distributing energy is the subject that has been discussed. The other side of the coin is the search for methods that will enable us to use those energy sources in the most efficient ways. We need energy to do useful work. Part of the goal now is to get the maximum amount of work out of the energy resources we have.

Ways of getting more out of our energy resources can be found in the most unlikely places—places that seem to have no relationship to energy at all. An excellent case in point is the line of ultra high strength steels produced by Teledyne Vasco. These special alloy steels such as VascoMax, VascoJet 1000, Matrix and X2 have tensile strengths ranging from 250,000 to 350,000 PSI compared to approximately 100,000 PSI for common steels. They are used in aircraft, missiles and other vehicles for certain parts that need exceptionally high strength. If common steels were used for those parts their size and weight would have to be so much greater that the energy required to propel those vehicles would increase substantially. A surprising bonus is that less energy is required to produce these ultra high strength steels than for lesser grades.

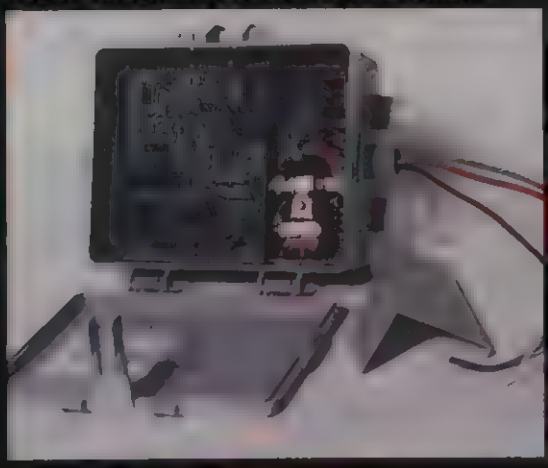
EASY ROLLERS

Tires also would seem to have little to do with energy saving, but the fact is that some tires roll more easily than others. Teledyne Monarch Rubber, a major producer of rubber tires for industrial use, has done considerable research on this problem. The company's line of Econo-Miser solid press-on rubber tires for electric powered forklift trucks have been compounded to significantly reduce power consumption required to maintain tire rolling. This conserves energy in the form of electricity and reduces wear on the motor and other components. Tire life has also been improved without

Ultra high strength steels made by Teledyne Vasco reduce the weight of critical parts for aircraft and other vehicles, and thus reduce the energy needed to propel the vehicles.



Load control receivers built by Teledyne Lewisburg automatically shut off electric water heaters of residential customers during peak demand periods, reducing peak loads. Customers receive an incentive payment for participating.



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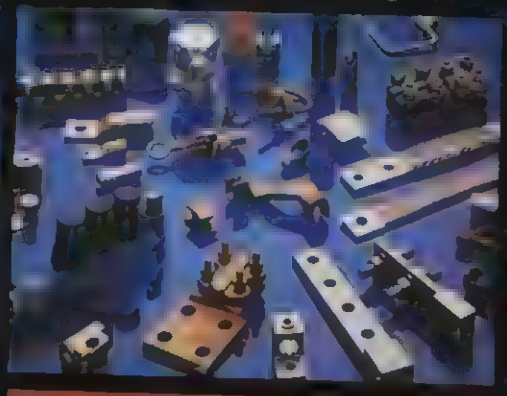
n its idle stage.

Above: Advanced numerically-controlled machines are used at Teledyne's engine manufacturing companies in the development of more fuel-efficient engines.

Power factor correction, built into Teledyne Ineri's synchronous motor generator frequency converters, reduces energy consumption for users of this type of equipment.

All new tire compounds introduced by Teledyne Monarch Rubber in the last four years have been designed to reduce rolling resistance, thus reducing energy consumption of industrial equipment.

Heavy-duty electrical connectors and accessories are made for power utilities and refineries by Teledyne Penn-Union. Some connectors weigh over 100 pounds.



Teledyne Crittenden transformers such as this one provide high-voltage used to remove particulate matter from the combustion gases of refineries and utilities.

Teledyne Laars' new pool and spa heaters achieve 78% efficiency compared to the 70% that has long been an industry standard.

sacrificing a soft ride to protect delicate components. The company's Mono-Thane Plus line of urethane rubber tires has also been formulated to achieve the same energy savings along with long life, as have all the new tire compounds introduced in the last four years.

SAVING INDUSTRIAL ELECTRICITY

Industrial processes of every sort require energy in one form or another, and many offer opportunities for energy savings. Teledyne Amco, for example, manufactures a heavy-duty industrial sewing machine drive known as the Variostop. This electronic drive features integrated circuit control logic and a unique electric clutch-brake system that provides the operator with variable speeds for instant machine control and more efficient operation. Another feature is a device that reduces consumption of electricity still further when the motor is in the idle stage.

POWER FACTOR CORRECTION

Power factor is the ratio of actual power used in an AC device in watts or kilowatts to the power which is apparently being drawn from the utility line in volt-amperes or kilovolt-amperes. Improper power factor results in poor electrical efficiency which is wasteful of energy, and also can cause overloaded generators, transformers and distribution lines. Teledyne Inet's synchronous motor generator frequency converter compensates for this problem. The synchronous motors of these converters can be electrically controlled in such a manner that existing local load conditions can be improved. This improvement, known as Power Factor Correction, reduces cost and energy consumption for users of this type of equipment.

ELECTRICITY FOR AIRLINES

Commercial airline aircraft require special 400 Hz (cycles per second) power to run their electronic and electrical systems while on the ground. Teledyne Inet supplies a centralized 400 Hz ground power distribution system to many airports throughout the world. This system converts 60 Hz utility power to 400 Hz and distributes it from a central source to multiple aircraft at the loading gates. This concept had not been tried before by others because of their inability to overcome unacceptable voltage variations within the cables over long distances.

Teledyne Inet made the centralized system possible by developing a line drop compensator and special cable configurations that eliminate the problem. The system saves energy by eliminating the use of the aircraft's high fuel consuming Auxiliary Power Unit (APU) and the expense of employing individual motor generator sets at each gate. For example, at today's rising fuel costs a typical APU operating cost for a 747 jet aircraft is over $120 per hour. At one domestic airport, a major airline recovered the capital cost of the system in one year's savings in fuel. Teledyne Inet is presently completing one of these systems in what will eventually be the largest airport in the world in Saudi Arabia. It will ultimately provide 200 gates for commercial airline use.

CUTTING THE ENERGY APPETITE OF ENGINES

A considerable amount of energy is consumed in machines and engines just to overcome the sliding and rolling friction between the internal parts. Teledyne Metal Finishers is a service organization that specializes in restoration of cylinder liners for railroad diesel engines and heavy duty compressors by applying a porous hard-chrome layer to their inner surfaces. By reducing friction this process increases the energy efficiency of the engines and compressors.

Teledyne's five engine manufacturing companies have always been vitally concerned with the fuel efficiency of their engines, with considerable attention paid to advanced carburetion techniques, fuel injection, turbocharging, combustion chamber and manifold design. Teledyne Continental Motors General Products Division, for example, has done considerable proprietary work on the development of a variable compression ratio piston that improves the performance and efficiency of diesel engines. A variable area turbocharger is also under development for heavy duty diesel engines that improves their efficiency over a wide range of operating speeds. A third line of research is investigation into the feasibility of diesel engines, with their greater fuel efficiency, for small aircraft use.

Teledyne Wisconsin Motor, producers of heavy-duty air-cooled industrial engines, introduced an entirely new line of air-cooled diesel engines early in 1979. Diesel engines are inherently more fuel-efficient than gasoline engines, and this new line of eight different models incorporates state-of-the-art design features that take advan-

tage of this efficiency. Cast iron cylinders and forged crankshafts combined with die-cast aluminum crankcase construction achieve exceptionally good weight-to-horsepower ratios.

Early in 1980, Teledyne Wisconsin Motor will also introduce a new series of two and four cylinder gasoline engines with updated designs that will reduce fuel consumption. Tests have shown that the new models will deliver greater fuel efficiency than most other L-head design air-cooled gasoline engines now on the market.

TRIMMING ENERGY USE IN THE HOME

One of the major problems facing public electrical utilities is the fact that demand for electricity varies greatly throughout the day. In order to provide reliable service, the utility must have a generating capacity capable of meeting the largest demand that occurs. This capacity is then excessive during other periods of the day in terms of energy consumption and capital investment. Utilities, consequently try various incentives to customers to encourage more even energy usage throughout the day.

Teledyne Lewisburg manufactures "load control receivers" that are used by some utilities to help solve this problem. These receivers are installed in the homes of residential customers by the utility. On a signal from the utility, transmitted to the load control receiver through the power lines, the utility can shut off the customer's electric water heater during periods of high peak demand. The customer gets a monthly incentive payment for permitting this. Teledyne Lewisburg has delivered 10,000 of these receivers and has orders for 25,000 more. Also under consideration for later production is a transponder unit for home installation that will permit automatic remote meter reading, thereby enabling more accurate peak demand trimming and reduced meter reading costs.

A new energy conservation product that the consumer can purchase and install himself in his own home or business is now manufactured by Teledyne Water Pik. It is a programmable thermostat control for heating and air conditioning systems. The unit which is microprocessor controlled is simply connected in place of the conventional low voltage room thermostat. A touch keyboard permits entering instructions for the desired temperatures at different times of day and different days of the week. Studies have shown that it is more economical and energy efficient to lower the heat setting or raise the air conditioning setting when away from home or during sleeping hours than it is to attempt to maintain an even temperature throughout the day. The unit incorporates a digital display that will display the current day of the week, time of day and room temperature on demand. Projections indicate that an 18 to 30 percent saving in heating and air conditioning bills can be achieved.

Approximately twenty percent of household energy is used to heat water. Teledyne Water Pik's Super Saver Shower Massage has been designed to use less than half the water used by conventional shower heads and gives the added bonus of stimulating massage action as well. Studies based on an averge family of four taking three five minute showers per day at a water pressure of 20 pounds per square inch project an average saving of 18,600 gallons of water and $80.00 in energy costs for heating water.

A substantial advance in water heating efficiency has also been made by Teledyne Laars, with the recent introduction of their new XE and XE Electronic pool and spa heaters. These new heaters are rated at 78 percent efficiency compared to the 70 percent that has long been an industry standard. This also goes beyond the 75 percent efficiency proposed by the state of California for 1982. The increased efficiency is due to the design of a new nine-tube finned copper heat exchanger and a new exchanger configuration for which patent applications have been made. Electronic ignition for natural gas fired models can save an estimated 45 therms of energy in a four month heating season compared to the energy consumed by a pilot light.

A new solid state electronic thermostat controls temperature fluctuation to within two degrees, compared to four degrees commonly found in conventional thermostats. This can represent a fuel saving of up to ten percent.

Teledyne Laars also manufactures highly efficient residential heating boilers which have received enthusiastic acceptance in severe winter areas.

This survey of Teledyne's energy-related activities has undoubtedly omitted many of the materials, products and services that are related to energy production and conservation in a more indirect way. There will certainly be many more developments as the United States and other countries search for ways to supply energy for the eighties, and Teledyne will be an important participant.

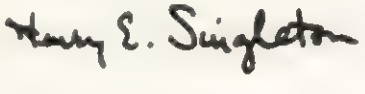
Net income for the year ended December 31, 1979 rose to $372.0 million from $248.5 million in 1978. Earnings per share in 1979 were $27.59 compared to $17.63 in 1978. Sales of consolidated companies were $2.71 billion, up from last year's $2.44 billion.

For the fourth quarter of 1979 net income was $91.7 million or $6.81 per share compared to last year's fourth quarter net income of $88.1 million or $6.34 per share. Consolidated fourth quarter sales rose to $697 million in 1979 from $654 million in 1978.

The use of equity accounting for certain investments of unconsolidated subsidiaries increased 1979 net income $44.0 million or $3.26 per share, compared to a decrease in 1978 net income of $16.9 million or $1.20 per share. In the fourth quarter, the effect of equity accounting was to increase net income $8.2 million or $0.61 per share in 1979 and $3.3 million or $0.24 per share in 1978.

Equity in net income of unconsolidated subsidiaries includes $30.7 million or $2.28 per share in 1979 from gains on sales of investments, compared to losses on sales of investments of $2.0 million or $0.15 per share in 1978.

Revenue and operating profit by business segment are shown on page 38 of this report. Management's Discussion and Analysis of Summary of Operations is given on page 34. Revenues increased in all business segments except consumer products and operating profit increased in all except industrial products. In summary, the year 1979 was the best ever for Teledyne in sales, net income and earnings per share.



Chairman of the Board of Directors

President

Consolidated Statements of Income

For the Years Ended December 31, 1979 and 1978

	1979	1978
Consolidated Sales	$2,705,600,000	$2,441,629,000
Consolidated Costs and Expenses:		
Cost of sales	1,995,643,000	1,805,657,000
Selling and administrative expenses	319,026,000	279,335,000
Interest expense (Notes 4 and 7)	12,505,000	15,843,000
Interest and dividend income	(22,689,000)	(16,756,000)
Provision for income taxes (Note 6)	193,800,000	181,600,000
	2,498,285,000	2,265,679,000
Income of Consolidated Companies	207,315,000	175,950,000
Equity in Net Income of Unconsolidated Subsidiaries, after allocated interest expense and income tax items (Notes 4 and 7)	164,645,000	72,553,000
Net Income	$ 371,960,000	$ 248,503,000
Net Income Per Share (Note 2)	$27.59	$17.63

Consolidated Statements of Retained Earnings

For the Years Ended December 31, 1979 and 1978

	1979	1978
Balance, Beginning of Year	$ 787,599,000	$ 668,395,000
Net income	371,960,000	248,503,000
Fair value of common stock dividends (Note 2)	(123,016,000)	(116,170,000)
Redemption of $6 series preferred stock	—	(12,742,000)
Cash dividends on preferred stock	—	(387,000)
Balance, End of Year	$1,036,543,000	$ 787,599,000

The accompanying notes are an integral part of these statements.

Consolidated Balance Sheets

December 31, 1979 and 1978

Assets

	1979	1978
Current Assets:		
Cash	$ 42,875,000	$ 43,691,000
Marketable securities, at cost (market—$233,088,000 in 1979 and $221,202,000 in 1978)	213,022,000	218,957,000
Receivables, less reserve of $10,443,000 in 1979 and $10,492,000 in 1978	323,181,000	283,978,000
Inventories (Note 3)	163,163,000	167,686,000
Prepaid expenses	5,369,000	4,653,000
Total current assets	747,610,000	718,965,000
Investments in Unconsolidated Subsidiaries (Note 7):		
Life insurance companies	395,210,000	291,170,000
Casualty insurance companies	541,274,000	236,738,000
	936,484,000	527,908,000
Property and Equipment, at cost (Note 4):		
Land	17,562,000	17,036,000
Buildings	122,636,000	113,495,000
Equipment and improvements	524,796,000	482,316,000
	664,994,000	612,847,000
Less accumulated depreciation and amortization	356,740,000	328,377,000
	308,254,000	284,470,000
Other Assets:		
Cost in excess of net assets of purchased businesses (Note 7)	30,230,000	30,276,000
Other	4,619,000	5,049,000
	34,849,000	35,325,000
	$2,027,197,000	$1,566,668,000

The accompanying notes are an integral part of these balance sheets.

Liabilities and Shareholders' Equity	1979	1978
Current Liabilities:		
Accounts payable	$ 122,778,000	$ 109,054,000
Accrued liabilities	202,145,000	166,067,000
Accrued income taxes (Note 6)	62,000,000	61,300,000
Current portion of long-term debt (Note 4)	20,774,000	21,239,000
Total current liabilities	407,697,000	357,660,000
Long-Term Debt (Note 4)	243,617,000	261,695,000
Deferred Income Taxes (Note 6)	90,000,000	61,600,000
Other Long-Term Liabilities	10,477,000	10,356,000
Commitments and Contingencies (Note 14)		
Shareholders' Equity:		
Common stock, $1 par value, 60,000,000 shares authorized, 32,339,685 shares issued (including 18,877,134 shares in 1979 and 19,657,450 in 1978 in treasury)	32,340,000	32,340,000
Additional paid-in capital	607,795,000	512,659,000
Retained earnings (Note 4)	1,036,543,000	787,599,000
Equity in net unrealized appreciation on stocks held by unconsolidated subsidiaries (Note 7)	68,301,000	9,402,000
	1,744,979,000	1,342,000,000
Less treasury stock, at cost	469,573,000	466,643,000
Total shareholders' equity	1,275,406,000	875,357,000
	$2,027,197,000	$1,566,668,000

Consolidated Statements of Changes in Financial Position

For the Years Ended December 31, 1979 and 1978

	1979	1978
Working Capital was Provided by:		
Net income	$371,960,000	$248,503,000
Equity in net income of unconsolidated subsidiaries before allocated interest expense and income tax items (Note 7)	(199,146,000)	(77,688,000)
Depreciation and amortization of property and equipment	67,408,000	57,236,000
Change in deferred income taxes	28,400,000	3,300,000
Other amortization and charges not affecting working capital	2,187,000	3,418,000
Working capital provided from operations	270,809,000	234,769,000
Increase in long-term debt	4,472,000	25,617,000
Dispositions of property and equipment	1,329,000	3,956,000
Issuance of common stock for the exercise of warrants and stock options	—	3,065,000
	276,610,000	267,407,000
Working Capital was Applied to:		
Investments in and advances to unconsolidated subsidiaries	150,531,000	1,996,000
Additions to property and equipment	92,521,000	102,019,000
Acquisition of treasury stock	28,939,000	64,868,000
Reduction in long-term debt	23,835,000	79,159,000
Redemption of preferred stock	—	5,629,000
Other, net	2,176,000	3,451,000
	298,002,000	257,122,000
Increase (Decrease) in Working Capital	$(21,392,000)	$ 10,285,000
Working Capital Increase (Decrease):		
Cash	$ (816,000)	$ (977,000)
Marketable securities	(5,935,000)	(23,343,000)
Receivables	39,203,000	31,533,000
Inventories	(4,523,000)	6,519,000
Prepaid expenses	716,000	(1,353,000)
Accounts payable	(13,724,000)	(12,321,000)
Accrued liabilities	(36,078,000)	(18,326,000)
Accrued income taxes	(700,000)	44,600,000
Current portion of long-term debt	465,000	(16,047,000)
	$(21,392,000)	$ 10,285,000

The accompanying notes are an integral part of these statements.

Consolidated Statements of Capital Stock, Additional Paid-In Capital and Treasury Stock

For the Years Ended December 31, 1979 and 1978

	Preferred Stock ($1 Par Value)	*Common Stock ($1 Par Value)*	*Additional Paid-In Capital*	*Treasury Stock*
Balance, December 31, 1977	$516,000	$32,340,000	$445,885,000	$457,595,000
Stock issuance:				
Common stock dividend (1,198,577 shares)	—	—	89,280,000	(25,484,000)
Conversion of $6 series preferred stock (312,613 common shares issued)	(234,000)	—	(6,441,000)	(6,646,000)
Exercise of warrants (78,995 shares)	—	—	1,258,000	(1,797,000)
Exercise of stock options (583 shares)	—	—	(3,000)	(13,000)
Redemption of $6 series preferred stock (282,149 shares, including retirement of 225,912 shares held in treasury)	(282,000)	—	(14,485,000)	(21,880,000)
Acquisition of common stock (722,150 shares)	—	—	—	64,868,000
Purchase of warrants	—	—	(2,835,000)	—
Balance, December 31, 1978	$ —	32,340,000	512,659,000	466,643,000
Common stock dividend (1,039,881 shares)		—	95,136,000	(26,009,000)
Acquisition of common stock (259,565 shares)		—	—	28,939,000
Balance, December 31, 1979		$32,340,000	$607,795,000	$469,573,000

The accompanying notes are an integral part of these statements.

Auditors' Report

To the Shareholders and
Board of Directors, Teledyne, Inc.:

We have examined the consolidated balance sheets of Teledyne, Inc. (a Delaware corporation) and subsidiaries as of December 31, 1979, and 1978, and the related statements of income, capital stock, additional paid-in capital and treasury stock, retained earnings and changes in financial position for the years then ended. Our examinations were made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances. The consolidated financial statements of Unicoa Corporation and subsidiaries were examined by other auditors whose reports thereon have been furnished to us. Our opinion expressed herein, insofar as it relates to the amounts included for Unicoa Corporation and subsidiaries, is based solely upon the reports of the other auditors. Teledyne's investment in Unicoa was 21 percent in 1979 and 20 percent in 1978 of consolidated assets and its equity in Unicoa's net income, after allocated interest expense and income tax credits as described in Note 7, was 10 percent in 1979 and 16 percent in 1978 of consolidated net income. Additionally, our opinion expressed herein, insofar as it relates to amounts included for equity in net income of investees (Notes 1 and 12), is based upon the reports of other auditors. Teledyne's equity in the net income of these investees, after taxes, was 14 percent of consolidated net income in 1979.

In our opinion, based upon our examinations and the reports of other auditors, the financial statements referred to above present fairly the consolidated financial position of Teledyne, Inc. and subsidiaries as of December 31, 1979, and 1978, and the results of their operations and changes in their financial position for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis after giving retroactive effect to the change (with which we concur) by Teledyne's unconsolidated subsidiaries in the method of accounting for investments in stocks of unaffiliated companies, as explained in Note 7 to the consolidated financial statements.

ARTHUR ANDERSEN & CO.

Los Angeles, California,
January 8, 1980.

(1) Summary of Significant Accounting Policies. *Principles of Consolidation.* The consolidated financial statements of Teledyne, Inc. include the accounts of all its subsidiaries except its insurance and finance subsidiaries. The investments in unconsolidated subsidiaries, which include advances, are accounted for by the equity method. All material intercompany accounts and transactions have been eliminated.

Currency Translation. All assets and liabilities of foreign subsidiaries and other foreign currency assets and liabilities are translated at current rates with the exception of inventories, property and equipment and prepaid expenses which are translated at historical rates. Net translation gains and losses, which are not material, are included in operations in the period in which they occur.

Inventories. Inventories are stated at the lower of cost (last-in, first-out and first-in, first-out methods) or market, less progress payments received. Costs include direct material and labor costs and applicable manufacturing and engineering overhead. Sales and related costs are recorded as products are delivered and as services are performed, including products and services under long-term contracts. Costs of products delivered and services performed under such long-term contracts are removed from inventory and charged to cost of sales at amounts approximating actual cost. Any foreseeable losses are charged to income when determined.

Depreciation and Amortization. Buildings and equipment are depreciated on straight-line and declining balance bases. Estimated useful lives are 5 to 45 years for buildings and 3 to 20 years for machinery and equipment. Leasehold improvements and patents are amortized on a straight-line basis over the life of the lease or patent. Maintenance and repairs are charged against income as incurred and betterments and major renewals are capitalized. Cost and accumulated depreciation of property sold, retired or fully depreciated are removed from the accounts, and any resultant gain or loss is included in income.

Cost in Excess of Net Assets of Purchased Businesses. Except for an immaterial amount being amortized, cost in excess of net assets of purchased businesses relates to businesses purchased prior to October 31, 1970 and is not being amortized.

Research and Development. Company funded research and development costs are expensed as incurred. Costs related to customer funded research and development contracts are charged to income as sales are recorded.

Pension Expense. Pension expense is accrued at amounts equal to normal cost plus a portion of prior service costs. The Company contributes accrued pension expense on a current basis.

Income Taxes. Provision for income taxes includes state, Federal and foreign income taxes. Deferred income taxes are provided for timing differences in the recognition of income and expenses, income of the domestic international sales corporation not currently taxed, and undistributed earnings of subsidiaries, except for a portion of the earnings arising from life insurance operations. Investment tax credits are amortized over the estimated lives of the related assets. Certain unconsolidated subsidiaries are included in the Company's consolidated income tax returns; accordingly, accrued and deferred income taxes include amounts representing income tax liabilities resulting from the operations of these subsidiaries.

Other Investments. Investments held by Teledyne's unconsolidated subsidiaries are accounted for by the equity method in the Company's consolidated financial statements when the aggregate voting percentage has exceeded 20 percent for one full quarter. Teledyne's voting percentage and share of earnings or losses are determined using the most recent publicly available audited financial statements and subsequent unaudited interim reports of each investee company.

(2) Net Income Per Share. The weighted average number of shares of common stock, including common stock equivalents in 1978, used in the computation of net income per share was 13,481,630 in 1979 and 14,067,879 in 1978. In 1978, the common stock equivalents, consisting of dilutive options and warrants, were considered outstanding from the beginning of the year. There were no common stock equivalents outstanding in 1979. The 1978 financial statements and related notes, except for shareholders' equity, have been restated to reflect an 8.5 percent common stock dividend paid in April, 1979.

(3) Inventories. At December 31, 1979 and 1978, the Company's inventories were as follows:

	1979	*1978*
Last-in, first-out method	$229,936,000	$202,447,000
First-in, first-out method	29,253,000	40,432,000
	259,189,000	242,879,000
Less progress billings	96,026,000	75,193,000
	$163,163,000	$167,686,000

Inventories related to long-term contracts were $60,459,000 and $61,051,000 at December 31, 1979 and 1978, respectively. Progress payments related to long-term contracts were $72,541,000 and $58,547,000 at December 31, 1979 and 1978, respectively. Inventories stated on a last-in, first-out basis were $189,102,000 and $139,228,000 less than their first-in, first-out values at December 31, 1979 and 1978, respectively.

(4) Long-Term Debt. At December 31, 1979, the Company's long-term debt was as follows:

10% Subordinated Debentures, due 2004, Series A, $5,452,000 payable annually commencing in 1994 (net of unamortized discount of $27,184,000)	$ 79,375,000
7½% Term Notes, due 1982, $15,000,000 payable annually	60,000,000
7% Subordinated Debentures, due 1999, $1,861,000 payable annually commencing in 1989	35,900,000
7⅞% Sinking Fund Debentures, due 1994, $1,400,000 payable annually	20,803,000
8¾% Promissory Notes, due 1983	20,000,000
6½% Sinking Fund Debentures, due 1992, $1,350,000 payable annually	15,690,000
7% Promissory Notes, due 1989, $1,500,000 payable annually	15,250,000
6½% Subordinated Debentures, due 1983	6,490,000
Other (including $10,105,000 of capitalized leases and debt secured by property and equipment), due in various installments to 1991	10,883,000
	264,391,000
Less current portion	20,774,000
	$243,617,000

Long-term debt is payable $20,774,000 in 1980, $19,820,000 in 1981, $35,230,000 in 1982, $31,220,000 in 1983 and $4,514,000 in 1984, after reduction for long-term debt repurchased to meet sinking fund requirements. Interest expense was $27,429,000 in 1979 and $28,764,000 in 1978, of which $14,924,000 in 1979 and $12,921,000 in 1978 was allocated to unconsolidated subsidiaries. Discount amortization of $1,285,000 in 1979 and $1,217,000 in 1978 is included in interest expense.

Under various borrowing agreements, the Company has agreed to maintain minimum amounts of working capital and net worth, and has agreed to certain restrictions with respect to borrowing, sale of assets, purchase of capital stock and payment of dividends. At December 31, 1979, these agreements were complied with, and retained earnings of $813,212,000 were not restricted by these agreements as to payment of dividends.

(5) Other Costs and Expenses. Total pension expense was $39,230,000 and $35,623,000 in 1979 and 1978, respectively. As of December 31, 1979, the actuarially computed value of vested benefits exceeded the total of the pension fund assets and balance sheet accruals by approximately $10,000,000. The actuarially computed value of prior service costs exceeded such assets and accruals by approximately $38,000,000.

Company funded research and development costs of $34,200,000 and $30,900,000 were charged to costs and expenses in 1979 and 1978, respectively.

(6) Income Taxes. The provision for income taxes for the years ended December 31, 1979 and 1978 were as follows:

	1979	1978
Federal	$159,300,000	$153,800,000
State	26,300,000	21,000,000
Foreign	8,200,000	6,800,000
	$193,800,000	$181,600,000

Such provision consisted of the following:

	1979	1978
Current	$183,700,000	$168,100,000
Deferred	13,900,000	16,400,000
Investment credits	(3,800,000)	(2,900,000)
	$193,800,000	$181,600,000

Deferred taxes arise principally as a result of the income of the domestic international sales corporation and deferred investment tax credits. The effective tax rate differs from the statutory U.S. Federal income tax rate of 46 percent in 1979 and 48 percent in 1978 principally due to state and local income taxes.

Unamortized investment tax credits of approximately $16,400,000 and $14,000,000, to be amortized over periods of up to seven years, are included in deferred income taxes as of December 31, 1979 and 1978, respectively.

(7) Investments in Unconsolidated Subsidiaries. Equity in net income of unconsolidated subsidiaries, after allocated interest expense and income tax items, for the years ended December 31, 1979 and 1978, was as follows:

	1979	1978
Equity in net income of:		
Life insurance companies	$ 66,584,000	$ 31,525,000
Casualty insurance companies	132,562,000	46,163,000
	199,146,000	77,688,000
Allocated interest expense	(14,924,000)	(12,921,000)
Income tax items:		
Deferred taxes on equity in net income of investments (Note 12)	(14,163,000)	1,275,000
Consolidated return effect	(6,957,000)	560,000
Allocated interest expense	7,313,000	6,590,000
Interest income—UIC Investments, Inc.	(4,848,000)	—
Undistributed earnings of unconsolidated subsidiaries	(922,000)	(639,000)
	$164,645,000	$ 72,553,000

The Company's investment in life insurance companies consists primarily of the 95.3 percent ownership of Unicoa Corporation (Note 8). The Company's investment in casualty insurance companies consists primarily of the investment in domestic casualty insurance subsidiaries (Note 9), principally Argonaut Insurance Company and Trinity Universal Insurance Company; these subsidiaries are wholly-owned as to voting securities. Included in the equity in net income of the life and casualty insurance companies are amounts representing the incremental effect before taxes of accounting for certain investments by the equity method (Note 12). The effect was to increase (decrease) equity in net income of life insurance subsidiaries by $22,517,000 and $(8,876,000) in 1979 and 1978, respectively, and of casualty insurance subsidiaries by $35,629,000 and $(9,330,000) in 1979 and 1978, respectively.

During 1979, the Company advanced a total of $160,500,000 to UIC Investments, Inc., a subsidiary of the Company's life and casualty insurance subsidiaries, in the form of short-term notes. Interest is charged on these notes at rates determined from a bank's prime lending rate at the time of issuance or renewal. Interest income on these advances of $1,979,000 is included in equity in net income of life insurance companies, and $7,914,000 is included in equity in net income of casualty insurance companies.

Interest expense was allocated to unconsolidated subsidiaries based on the ratio of the Company's average investment in unconsolidated subsidiaries to average total capital.

The income tax item for the consolidated return effect represents the difference between the income tax credit or provision on a consolidated basis and the amount recorded by the unconsolidated subsidiaries on a separate basis. The effective tax rate used in computing these amounts differs from the statutory U.S. Federal income tax rate of 46 percent in 1979 and 48 percent in 1978 principally because of tax-exempt investment income.

The Company's equity in the net assets of its unconsolidated subsidiaries was $728,958,000 in 1979 and $375,554,000 in 1978, including its equity of $363,560,000 in 1979 and $232,574,000 in 1978, in their retained earnings. In consolidation, a portion of the difference between the Company's investments in purchased subsidiaries and the book value of their assets has been allocated to bonds and amortized over the applicable maturity of the bonds or charged or credited to income upon their disposition. The Company's investment exceeded its equity in net assets by $187,490,000 in 1979 and $187,499,000 in 1978. Such excess is in addition to the excess shown in the consolidated balance sheets and is not being amortized since, in the opinion of management, there has been no diminution in its value. The Company's equity in net income of its unconsolidated subsidiaries includes gains (losses) on sales of investments of $30,679,000 in 1979 and $(2,042,000) in 1978.

As of January 1, 1979, in accordance with a Statement of Position issued by the Accounting Standards Division of the American Institute of Certified Public Accountants, the Company's unconsolidated insurance subsidiaries changed their method of accounting for investments in stocks of unaffiliated companies. In order to be consistent with the insurance subsidiaries, UIC Investments, Inc., a subsidiary of Teledyne's life and casualty insurance subsidiaries, has also adopted this method. These stocks, which were previously carried primarily at the lower of cost or market, are now carried at market value. The consolidated balance sheet as of December 31, 1978 has been restated to reflect the effect of this change. The effect of this change was to increase investments in unconsolidated subsidiaries and shareholders' equity by $68,301,000 and $9,678,000 at December 31, 1979 and 1978, respectively. There was no effect on net income.

Equity in net unrealized appreciation on stocks held by unconsolidated subsidiaries, excluding those accounted for by the equity method, increased $58,899,000 in 1979 and $5,750,000 in 1978. This appreciation was not included in the results of operations.

The Company's equity in the gross unrealized gains and gross unrealized losses, before taxes, on stocks held by unconsolidated subsidiaries, excluding those accounted for by the equity method, was $130,376,000 and $35,052,000, respectively, at December 31, 1979.

(8) Unicoa Corporation and Subsidiaries. The following condensed statements summarize the consolidated financial position and operating results of Unicoa Corporation and subsidiaries.

Consolidated Balance Sheets

	December 31, 1979	December 31, 1978
Assets:		
Investments:		
Bonds and notes, at amortized cost (market: 1979—$437,682,000; 1978—$366,752,000)	$ 454,069,000	$379,309,000
Stocks, principally at market (cost: 1979—$275,547,000; 1978—$246,506,000)	369,975,000	265,095,000
Mortgage loans on real estate, less reserve of $8,087,000 in 1979 and $7,640,000 in 1978	85,378,000	92,185,000
Real estate held for investment, at cost, less accumulated depreciation	34,397,000	38,704,000
Other loans and investments	18,985,000	17,526,000
Total investments	962,804,000	792,819,000
Cash	3,796,000	4,088,000
Uncollected premiums	35,971,000	28,768,000
Deferred policy acquisition costs	104,138,000	114,917,000
Cost in excess of net assets of purchased businesses	24,875,000	25,336,000
Other assets	20,070,000	22,826,000
	$1,151,654,000	$988,754,000
Liabilities and Shareholders' Equity:		
Policy reserves and liabilities	$ 690,849,000	$646,856,000
Notes payable to banks	—	24,800,000
Long-term debt	23,736,000	24,410,000
Deferred income taxes	72,133,000	50,135,000
Other liabilities	35,514,000	32,074,000
Shareholders' equity	329,422,000	210,479,000
	$1,151,654,000	$988,754,000

Consolidated Statements of Income

	Year Ended December 31, 1979	Year Ended December 31, 1978
Premiums and Other Revenue:		
Premiums	$ 309,712,000	$280,050,000
Net investment income	54,669,000	39,875,000
Other income	1,190,000	2,515,000
	365,571,000	322,440,000
Expenses:		
Benefits paid or provided	163,489,000	128,222,000
Selling and administrative expenses	151,174,000	135,986,000
Interest expense	3,003,000	4,122,000
Provision for income taxes	12,413,000	11,159,000
	330,079,000	279,489,000
	35,492,000	42,951,000
Gain on Sale of Investments	8,434,000	213,000
Net Income	$ 43,926,000	$ 43,164,000

The above statements have been prepared on the basis of generally accepted accounting principles which differ from statutory insurance accounting practices. Life insurance premiums are recognized as revenue when they become due, and revenues, benefits and expenses on accident and health insurance are recognized over the period to which the premiums relate. Deferred taxes are provided for timing differences in the recognition of income and expenses. Deferred income taxes related to unrealized appreciation on stocks are included in the determination of net unrealized appreciation included in shareholders' equity.

As discussed in Note 7, Unicoa Corporation and subsidiaries changed their method of accounting for investments in stocks of unaffiliated companies, including those accounted for by the equity method in the consolidated financial statements of Teledyne. The unrealized appreciation of stocks, net of applicable income taxes, is included in shareholders' equity. The consolidated balance sheet as of December 31, 1978 has been restated to reflect the effect of this change. The effect of this change was to increase shareholders' equity by $89,824,000 and $14,807,000 at December 31, 1979 and 1978, respectively. The unrealized appreciation includes $22,184,000 and $1,423,000 at December 31, 1979 and 1978, respectively, representing the equity in net unrealized appreciation on stocks held by UIC Investments, Inc. a 20 percent owned unconsolidated subsidiary. There was no effect on net income.

A portion of life insurance income is not subject to Federal income tax until such amount exceeds certain limitations or is distributed to shareholders as dividends. At December 31, 1979, up to $64,000,000 (at current tax rates) would be required for possible Federal income taxes which might become due, in whole or in part, in future years if any portion of $139,000,000 of the gains from operations since January 1, 1959 (which includes $12,000,000 from 1979 and $13,000,000 from 1978) becomes includable in taxable income as a result of such limitations, including distributions in excess of $71,000,000 as dividends.

As a result of studies performed during 1979, a subsidiary of Unicoa Corporation revised the basis of estimation of policy acquisition costs deferred in order to reflect actual experience more closely. The effect of this revision was to reduce net income of Unicoa Corporation by $9,306,000 in 1979.

(9) Domestic Casualty Insurance Subsidiaries. The following condensed statements summarize the combined financial position and operating results of the Company's domestic casualty insurance subsidiaries.

Combined Balance Sheets

	December 31, 1979	December 31, 1978
Assets:		
Investments:		
Bonds and notes, at amortized cost (market: 1979—$419,347,000; 1978—$496,432,000)	$ 456,252,000	$ 516,464,000
Stocks, principally at market (cost: 1979—$729,390,000; 1978—$456,590,000)	849,898,000	466,007,000
Invested cash	1,300,000	4,690,000
Total investments	1,307,450,000	987,161,000
Cash	16,703,000	18,991,000
Agents' balances and uncollected premiums	47,964,000	47,549,000
Other receivables	33,462,000	38,800,000
Deferred policy acquisition costs	17,976,000	16,324,000
Property and equipment, at cost less accumulated depreciation	3,520,000	3,902,000
Cost in excess of net assets of purchased businesses	4,783,000	4,783,000
	$1,431,858,000	$1,117,510,000
Liabilities and Shareholders' Equity:		
Loss and claim reserves	$ 659,420,000	$ 646,377,000
Accrued loss adjustment expenses	111,148,000	105,168,000
Unearned premiums	115,815,000	119,632,000
Deferred income taxes	34,332,000	2,838,000
Other liabilities	85,402,000	57,094,000
Shareholders' equity	425,741,000	186,401,000
	$1,431,858,000	$1,117,510,000

Combined Statements of Income

	Year Ended December 31, 1979	1978
Premiums and Other Revenues:		
Net premiums earned	$ 403,874,000	$ 367,889,000
Net investment income	66,513,000	48,832,000
	470,387,000	416,721,000
Expenses:		
Losses and loss adjustment expenses	292,943,000	253,891,000
Selling and administrative expenses	105,486,000	96,591,000
Provision for income taxes	17,605,000	15,818,000
	416,034,000	366,300,000
	54,353,000	50,421,000
Gain (Loss) on Sale of Investments	17,378,000	(1,116,000)
	71,731,000	49,305,000
Income Tax Reduction	17,282,000	7,369,000
Net Income	$ 89,013,000	$ 56,674,000

The above statements have been prepared on the basis of generally accepted accounting principles, which differ from statutory insurance accounting practices. Premium income, policy acquisition costs and policyholder dividends are recognized ratably over the period to which the premiums relate. Losses and loss adjustment expenses are provided at the estimated amounts necessary to settle incurred claims. Deferred taxes are provided for timing differences in the recognition of income and expenses to the extent such deferred taxes are determined to be due in subsequent years. Deferred income taxes related to unrealized appreciation on investments in stocks are included in the determination of net unrealized appreciation included in shareholders' equity.

As discussed in Note 7, the domestic casualty insurance subsidiaries changed their method of accounting for investments in stocks of unaffiliated companies, including those accounted for by the equity method in the consolidated financial statements of Teledyne. The unrealized appreciation of stocks, net of applicable income taxes, is included in shareholders' equity. The combined balance sheet as of December 31, 1978 has been restated to reflect the effect of this change. The effect of this change was to increase shareholders' equity by $175,501,000 and $12,474,000 at December 31, 1979 and 1978, respectively. There was no effect on net income.

Investments in stocks include $115,017,000 and $37,176,000 at December 31, 1979 and 1978, respectively, of investments in the common stock of unconsolidated subsidiaries accounted for by the equity method. Of this amount, $88,735,000 and $5,694,000 at December 31, 1979 and 1978, respectively, is included in shareholders' equity representing the equity in the net unrealized appreciation on stocks held by UIC Investments, Inc., an 80 percent owned unconsolidated subsidiary accounted for by the equity method. Shareholders' equity includes certificates of contribution of $10,000,000 and $20,000,000 in 1979 and 1978, respectively, originally issued in exchange for Teledyne's 10% subordinated debentures. These debentures, $10,000,000 in 1979 and $20,000,000 in 1978, are included in bonds and notes in the above combined balance sheets.

Taxable income of the domestic casualty insurance subsidiaries is included in the consolidated income tax returns of Teledyne. Certain of the subsidiaries reimburse Teledyne for their portion of Teledyne's consolidated Federal income tax liability. The Federal income tax provision reflected in the combined financial statements approximates the provision which would be made on a separate company basis. Certain of the domestic casualty insurance subsidiaries are not being required to reimburse Teledyne for their 1979 and 1978 Federal income tax provisions. The income tax reduction of $17,282,000 in 1979 and $7,369,000 in 1978 in the combined statements of income represents the amount of those taxes which will not be reimbursed.

(10) UIC Investments, Inc. The following condensed statements summarize the financial position and operating results of UIC Investments, Inc. UIC Investments, Inc. is 80 percent owned by Trinity Universal Insurance Company and 20 percent owned by a wholly-owned subsidiary of Unicoa Corporation.

Balance Sheets

	December 31,	
	1979	*1978*
Assets:		
Investments in common stocks, at market (cost: 1979—$184,984,000; 1978—$194,177,000)	$339,038,000	$204,062,000
Short-term investments, at cost which approximates market	800,000	4,000,000
Cash	54,000	197,000
Accrued investment income	1,762,000	481,000
	$341,654,000	$208,740,000
Liabilities and Shareholders' Equity (Deficit):		
Notes payable to banks	$ —	$140,000,000
Accounts payable	28,000	12,000
Accrued interest	2,600,000	1,584,000
Deferred income taxes	43,135,000	2,768,000
Notes payable to affiliates	208,290,000	70,910,000
Shareholders' equity (deficit)	87,601,000	(6,534,000)
	$341,654,000	$208,740,000

Statements of Operations

	Year Ended December 31,	
	1979	*1978*
Investment income	$ 8,474,000	$ 5,624,000
Interest expense	25,429,000	17,417,000
Other expenses	91,000	98,000
Gain (Loss) on sale of investments	7,379,000	(457,000)
Net Loss	$ (9,667,000)	$(12,348,000)

As discussed in Note 7, UIC Investments, Inc. changed its method of accounting for investments in stocks, including those accounted for by the equity method in the consolidated financial statements of Teledyne. The unrealized appreciation of common stocks, net of applicable income taxes, is included in shareholders' equity. The balance sheet as of December 31, 1978 has been restated to reflect the effect of this change. The effect of this change was to increase shareholders' equity by $110,919,000 and $7,117,000 at December 31, 1979 and 1978, respectively. There was no effect on the results of operations.

Taxable income of UIC Investments, Inc. is included in the consolidated tax returns of Teledyne. No income tax credits have been included in the financial statements of UIC Investments, Inc. since the losses for tax purposes could not be used on a separate company basis.

(11) Fireside Securities Corporation and Subsidiaries. The following condensed statements summarize the consolidated financial position and operating results of Fireside Securities Corporation and subsidiaries. Fireside Securities Corporation is a wholly-owned subsidiary of Argonaut Insurance Company.

Consolidated Balance Sheets

	December 31,	
	1979	*1978*
Assets:		
Cash	$ 1,669,000	$ 2,798,000
Short-term investments, at cost which approximates market	8,395,000	4,983,000
Bonds, at amortized cost (market: 1979—$48,000; 1978—$338,000)	48,000	341,000
Loans receivable	155,658,000	148,718,000
Premises and equipment, at cost less accumulated depreciation	1,953,000	2,144,000
Other assets	630,000	872,000
	$168,353,000	$159,856,000
Liabilities and Shareholder's Equity:		
Investment certificates and passbook accounts	$141,452,000	$135,332,000
Other liabilities	3,576,000	3,073,000
Shareholder's equity	23,325,000	21,451,000
	$168,353,000	$159,856,000

Consolidated Statements of Income

	Year Ended December 31,	
	1979	*1978*
Revenues:		
Interest on loans	$ 27,981,000	$ 26,020,000
Other income	5,211,000	4,679,000
	33,192,000	30,699,000
Expenses:		
Interest on investment certificates and passbook accounts	10,955,000	8,823,000
General and administrative expenses	16,449,000	15,349,000
Provision for losses on loans receivable	2,006,000	2,180,000
Loss on sale of investments	—	322,000
Provision for income taxes	1,908,000	2,103,000
	31,318,000	28,777,000
Net Income	$ 1,874,000	$ 1,922,000

The consolidated financial statements of Fireside Securities Corporation include the accounts of all its subsidiaries. Loans receivable are stated net of unearned discount.

(12) Other Equity Investments. The Company's consolidated financial statements reflect the effects of the use of the equity method of accounting for certain investments owned by the Company's unconsolidated subsidiaries. Investments accounted for by the equity method, and approximate voting percentages based on the most recent publicly available data, were: Brockway Glass Company, Inc. (29 percent), Curtiss-Wright Corporation (31 percent), Litton Industries, Inc. (25 percent) and Reichhold Chemicals, Inc. (21 percent).

Teledyne's equity in the net income (loss) of these companies, including the effect of dividends recorded by its unconsolidated subsidiaries, was $53,463,000 in 1979 and $(12,151,000) in 1978. Income taxes (credits) have been provided at appropriate rates for that portion of the equity in net income received as dividends and at capital gains rates on the undistributed balance. The use of the equity method of accounting increased equity in net income of unconsolidated subsidiaries and net income by $43,983,000, or $3.26 per share, in 1979 and decreased equity in net income of unconsolidated subsidiaries and net income by $16,931,000, or $1.20 per share, in 1978.

These investments are carried at cost adjusted for Teledyne's equity in undistributed earnings since acquisition; this carrying value was $308,832,000 and $250,686,000 at December 31, 1979 and 1978, respectively. Teledyne's equity in the net assets of these companies exceeded the carrying value of the investments by approximately $41,000,000 in 1979. Of this amount, approximately $15,000,000 has been considered to be related to cost in excess of net assets of purchased businesses reported in the financial statements of the investee companies; the remaining balance is not being amortized. The aggregate market value of these investments, based on quoted market prices, was $517,131,000 and $273,214,000 at December 31, 1979 and 1978, respectively.

(13) Business Segments. The Company's major business segments include industrial products, specialty metals, aviation and electronic products and consumer products. Internal combustion engines are the major product of the industrial segment, including the manufacture of air and water cooled, gasoline and diesel fueled engines. Other products in this segment include machine tools, dies and consumable tooling. Specialty metal products include zirconium, high speed and alloy steels, tungsten and molybdenum. Other operations in this segment include processing, casting, roll forming and forging metals into a variety of finished forms. Aviation and electronic products include aircraft engines, remotely piloted vehicles, drone systems, spacecraft and avionics. This segment also includes semiconductors, relays, aircraft monitoring and control systems, military electronic equipment and other related products and systems. The consumer segment includes oral hygiene products, shower massages, water filters, high fidelity speakers and other products and services.

The Company's unconsolidated subsidiaries are primarily insurance companies. One group writes life and accident and health insurance. Another group writes a broad line of casualty insurance including workers' compensation, liability, automobile, homeowners' and fire insurance. Business is done primarily in the United States.

Sales between business segments, which were not material, generally were priced at prevailing market prices. The Company's sales to the U.S. Government were $583,597,000 in 1979 and $562,021,000 in 1978, including direct sales as prime contractor and indirect sales as subcontractor; the industrial and aviation and electronics segments made most of these sales. Sales by operations in the United States to customers in other countries were $229,629,000 in 1979 and $189,751,000 in 1978.

Information on the Company's business segments for the years ended December 31, 1979 and 1978 is included in the information presented on pages 38 and 39 of this report.

(14) Commitments and Contingencies. Five lawsuits brought against the Company in the United States district courts in California, Michigan and Texas, alleging that the Company violated Federal securities laws and state laws in connection with certain repurchases or redemptions of its stock have been dismissed. Appeals in three of the actions have been dismissed or waived. In one action, the United States Court of Appeals for the Ninth Circuit has approved the District Court's reasons for dismissing the action and has remanded the case to the District Court for entry of a new order of dismissal or such other action as the District Court may deem appropriate. This action seeks an unspecified amount of money damages. The other action is on appeal to the United States Court of Appeals for the Ninth Circuit. This seeks money damages aggregating more than $8,600,000 and punitive damages of $5,000,000. Another action alleging claims relating to certain repurchases of stock has been filed in the Chancery Court of Delaware and seeks compensatory and punitive damages in an indeterminate amount and alternatively, rescission. The Company believes that the allegations made in these complaints are not meritorious and that the Company has in all instances adequate legal defenses.

(15) Selected Quarterly Financial Data (Unaudited). Quarterly financial data for 1979 and 1978 is as follows:

	Quarter Ended			
	March 31	*June 30*	*September 30*	*December 31*
1979—				
Consolidated Sales	$664,340,000	$689,163,000	$654,841,000	$697,256,000
Consolidated Gross Profit	$168,213,000	$178,639,000	$172,635,000	$190,470,000
Income of Consolidated Companies	$ 48,305,000	$ 54,296,000	$ 49,337,000	$ 55,377,000
Equity in Net Income of Unconsolidated Subsidiaries	38,400,000	33,753,000	56,186,000	36,306,000
Net Income	$ 86,705,000	$ 88,049,000	$105,523,000	$ 91,683,000
Average Shares Outstanding	13,538,866	13,462,551	13,462,551	13,462,551
Net Income Per Share	$6.40	$6.54	$7.84	$6.81
1978—				
Consolidated Sales	$578,021,000	$621,412,000	$588,487,000	$653,709,000
Consolidated Gross Profit	$144,216,000	$158,296,000	$156,497,000	$176,963,000
Income of Consolidated Companies	$ 34,302,000	$ 41,776,000	$ 43,335,000	$ 56,537,000
Equity in Net Income (Loss) of Unconsolidated Subsidiaries	18,354,000	24,036,000	(1,402,000)	31,565,000
Net Income	$ 52,656,000	$ 65,812,000	$ 41,933,000	$ 88,102,000
Average Shares Outstanding	14,160,454	14,157,307	14,044,474	13,896,139
Net Income Per Share	$3.69	$4.65	$2.99	$6.34

In the quarter ended September 30, 1979, equity in net income of unconsolidated subsidiaries included $28,362,000, or $2.11 per share, from gains on sales of investments.

As a result of studies performed during 1979, the Company's life insurance subsidiaries revised the basis of estimation of policy acquisition costs deferred in order to reflect actual experience more closely. The effect of this revision was to reduce equity in net income of unconsolidated subsidiaries by $8,869,000, or $0.66 per share, for the quarter ended September 30, 1979.

During the quarter ended September 30, 1978, a loss was reflected in equity in net income of unconsolidated subsidiaries. This resulted from the use of equity accounting for certain investments held by the subsidiaries, including an investment in Litton Industries, Inc. which reported a loss for its fourth quarter ended July 31, 1978.

(16) Supplemental Information on Replacement Cost (Unaudited). The impact of inflation on the costs of goods and services varied among the business segments. The effects of such inflation, and the related effects on selling prices, are generally reflected in the results of operations over a relatively short period of time. The impact of inflation on the replacement cost of productive capacity, however, is usually more long-term in nature. In compliance with the rules of the Securities and Exchange Commission, the Company has calculated certain estimated replacement cost information for inventories, cost of sales, property and equipment and the related depreciation and amortization. This information will be presented in the Annual Report on Form 10-K of Teledyne, Inc. for the year ended December 31, 1979.

Consolidated Summary of Operations

For the Five Years Ended December 31, 1979
(000's omitted except average share and per share amounts)

	1979	1978	1977	1976	1975
Consolidated sales	$2,705,600	$2,441,629	$2,209,731	$1,937,556	$1,714,972
Consolidated gross profit	$ 709,957	$ 635,972	$ 584,818	$ 500,387	$ 391,269
Consolidated interest expense (Note A)	$ 12,505	$ 15,843	$ 16,990	$ 18,756	$ 22,254
Consolidated provision for income taxes (Note B)	$ 193,800	$ 181,600	$ 159,800	$ 123,000	$ 85,300
Income of consolidated companies (Note E)	$ 207,315	$ 175,950	$ 151,837	$ 113,255	$ 82,619
Equity in net income of unconsolidated subsidiaries, after allocated interest expense and income tax items (Notes A, C and D)	164,645	72,553	42,946	23,544	19,087
Net income	371,960	248,503	194,783	136,799	101,706
Dividend requirements of preferred stock	—	387	1,739	2,365	3,425
Net income applicable to common shareholders	$ 371,960	$ 248,116	$ 193,044	$ 134,434	$ 98,281
Average shares outstanding:					
Primary	13,481,630	14,067,879	14,140,946	15,141,693	20,671,549
Fully diluted	N/A	14,188,459	14,609,645	15,774,066	21,535,046
Net income per share:					
Primary	$27.59	$17.63	$13.65	$8.90	$4.81
Fully diluted	N/A	$17.51	$13.33	$8.68	$4.76

The Company has paid stock dividends applicable to the common stock during each of the years presented above; no cash dividends have been paid on the common stock. Average shares outstanding and net income per share have been restated for all stock dividends.

N/A–Not applicable; no dilutive securities.

Notes to Consolidated Summary of Operations

(000's omitted except for per share amounts)

(A) Interest expense was $27,429 in 1979, $28,764 in 1978, $29,954 in 1977, $31,260 in 1976 and $34,980 in 1975, of which $14,924 in 1979, $12,921 in 1978, $12,964 in 1977, $12,504 in 1976 and $12,726 in 1975 was allocated to unconsolidated subsidiaries based on the ratio of the Company's average investment in unconsolidated subsidiaries to the Company's average total capital. Interest expense on long-term debt approximated total interest expense for all periods presented.

(B) The consolidated provision for income taxes includes the following:

	1979	1978	1977	1976	1975
Federal	$159,300	$153,800	$133,600	$106,500	$ 71,200
State	26,300	21,000	20,000	13,700	9,400
Foreign	8,200	6,800	6,200	2,800	4,700
Total	$193,800	$181,600	$159,800	$123,000	$ 85,300
Current	$183,700	$168,100	$154,500	$116,200	$ 76,700
Deferred	13,900	16,400	7,200	8,400	9,500
Investment credits	(3,800)	(2,900)	(1,900)	(1,600)	(900)
Total	$193,800	$181,600	$159,800	$123,000	$ 85,300

(C) The Company's equity in net income of its unconsolidated subsidiaries includes gains (losses) on sales of investments of $30,679 in 1979, $(2,042) in 1978, $(1,402) in 1977, $(6,874) in 1976 and $(9,435) in 1975.
(D) The equity method of accounting is used for certain investments held by the Company's unconsolidated subsidiaries. The incremental effect of the use of this method was to increase equity in net income of unconsolidated subsidiaries and net income by $43,983 or $3.26 per share in 1979, to decrease equity in net income of unconsolidated subsidiaries and net income by $16,931 or $1.20 per share ($1.19 fully diluted) in 1978 and to increase equity in net income of unconsolidated subsidiaries and net income by $11,137 or $0.79 per share ($0.76 fully diluted) in 1977 and by $1,920 or $0.13 per share ($0.12 fully diluted) in 1976. There was no effect on 1975.
(E) During each year, inventory usage resulted in liquidations of last-in, first-out inventory quantities. These inventories were carried at the lower costs prevailing in prior years as compared with the cost of current purchases. The effect of these last-in, first-out inventory liquidations was to increase net income by approximately $3,898 or $0.29 per share in 1979, $1,530 or $0.11 per share ($0.11 fully diluted) in 1978, $3,364 or $0.24 per share ($0.23 fully diluted) in 1977, $4,725 or $0.31 per share ($0.30 fully diluted) in 1976 and $6,150 or $0.30 per share ($0.29 fully diluted) in 1975.

Management's Discussion and Analysis of Summary of Operations

1979 Compared with 1978. Consolidated sales for the year ended December 31, 1979 increased approximately 11 percent over the prior year, due both to price increases and increased demand. All business segments had increased sales, except for the consumer segment which had a slight decline. The specialty metals and aviation and electronics segments experienced sales increases of approximately 21 and 19 percent, respectively. The gross profit rate did not change significantly, with gross profit rising in proportion to sales.

Selling and administrative expenses rose in 1979, partially the result of damage to the Company's facilities by Hurricane Frederic. Maintenance and repairs increased approximately $8.8 million from 1978. Interest and dividend income rose approximately $5.9 million due to higher yields in 1979. The increased provision for income taxes resulted from greater pre-tax income, reduced slightly by the lower Federal income tax rate.

Equity in net income of unconsolidated subsidiaries increased significantly in 1979, due primarily to the use of the equity method of accounting for certain investments owned by these subsidiaries; this equity accounting effect is discussed in Note D to the Consolidated Summary of Operations. Also, as discussed in Note C to the Consolidated Summary of Operations, gains on sales of investments increased significantly.

1978 Compared with 1977. Consolidated sales for the year ended December 31, 1978 increased approximately 10 percent over the prior year. The specialty metals, industrial and aviation and electronics segments had sales increases of approximately 16, 12 and 10 percent, respectively, resulting from both increased demand for these products and price increases. The consumer segment experienced a slight sales decline, principally as a result of lower volume. Consolidated gross profit increased approximately 9 percent, in line with the sales increase. A gross profit rate decline in the consumer segment was offset by improvements in other segments.

Interest expense declined slightly in 1978, primarily as a result of the repurchases and redemptions of long-term debt; this was partially offset by the issuance of new long-term debt during the year. Payroll taxes increased approximately 20 percent in 1978, the result of higher payroll tax rates. Interest and dividend income increased during 1978, primarily the result of higher yields available on investments. Advertising costs declined by approximately 20 percent in 1978, primarily in the consumer segment, where a higher level of costs had been incurred in 1977 in connection with the introduction of new products. The increase in pretax income resulted in a higher provision for income taxes.

Equity in net income of unconsolidated subsidiaries increased significantly in 1978, despite a substantial reduction due to the use of the equity method of accounting for certain investments owned by these subsidiaries; this equity accounting effect is discussed in Note D to the Consolidated Summary of Operations. Improved results of operations were reported by both the life insurance and the casualty insurance subsidiaries; these improved results were primarily due to improvements in underwriting, and net investment income also increased significantly. Underwriting improvements were especially significant in the accident and health segment of the Company's life insurance subsidiaries.

Industrial Products

Teledyne's diverse line of industrial products represents the company's largest single area of activity.

Engines of many sorts—air and water cooled, gasoline and diesel fueled—are major products in this category. Teledyne piston engines range in power from lightweight, portable, air cooled engines of a few horsepower up to heavy-duty turbocharged diesel engines approaching 2000 horsepower for use in military tanks and heavy construction equipment.

Another category of industrial products includes machine tools, dies and consumable tooling of all types. These range from numerically-controlled pipe and tube bending machines to a great variety of machines designed for the high speed production of precision machine threads by cutting, grinding and roll-forming methods, and a variety of similar equipment for the production of precision roll-formed gears. Presses, cut-off machines and can-making machines are also produced.

Other Teledyne production equipment includes transfer and assembly machines for the automated production of many kinds of products, as well as multi-gun automated resistance welding machines, single station manual resistance welding machines, welding power supplies, arc welding equipment and consumable supplies such as welding electrodes and tubular and solid welding wire.

Unusual among Teledyne's welding products are the world's largest welding positioners and manipulators with capacities to 450 tons. These immense Teledyne machines are used worldwide by the nuclear industry for welding and cladding nuclear reaction vessels with stainless steel.

Teledyne also produces complete automated bakery production lines and chemical process equipment as well.

Closely related to the machine tool field are Teledyne's optical encoders and digital readouts which may be added to existing milling machines and other machine tools to modernize them, increase operator output and improve the accuracy of the work produced.

Teledyne also makes a variety of analytical instruments for pollution control, mine and industrial safety, petrochemical process control, and for medical and deep sea saturation diving applications.

These include percentage and parts per million oxygen detectors, hydrocarbon detectors and photometric instruments for measuring oil or phenol in water and dozens of other chemicals in the parts per million or billion range. Other related products include a variety of instruments for the physical testing of materials, meteorological instruments, equipment and services for the detection, monitoring and analysis of radioactive materials including nuclear dosimeters for monitoring the exposure levels of nuclear industry personnel, high-speed motion picture cameras, and equipment for the film recording of video images.

Control systems based on computer logic are provided to the petrochemical industry for controlling the flow of natural gas and oil through nationwide networks of pipelines. Electrically actuated control valves and large safety relief valves are supplied to this and other industries, as well.

Teledyne also produces a complete line of seismic instrumentation and related computer systems used throughout the world in earthquake monitoring and oil exploration.

In addition, Teledyne carries out seismic surveys on land and under the sea bottom on a contract basis to locate likely oil bearing strata for major oil companies.

Related activities include the fabrication and installation of large offshore oil platforms for the oil industry, as well as drilling and workover services and a variety of maintenance and salvage operations carried out in offshore areas.

The company owns and operates sea-going derrick barges up to 800 ton lifting capacity and numerous submersible, jack-up, and platform-type drilling rigs to carry on this work for the oil industry.

Sophisticated computer designed gas-lift equipment and services are also provided by the company for stimulating and increasing the flow of older or less productive wells.

Related geophysical activities include aerial surveying and mapping services, as well as the production of a broad line of transits and theodolites for surveying use.

Among Teledyne's remaining miscellaneous industrial activities are the production of solid rubber tires and molded rubber products for the automotive industry.

Uninterruptible power supplies are produced for the computer industry to eliminate computer failures caused by substandard power or momentary power interruptions.

Thermoelectric generators fueled with propane or natural gas are made for use in remote unattended locations where small amounts of electrical power are required, and other Teledyne thermoelectric generators powered by radioisotopic materials provide power for deep space missions such as the Viking probes to Mars. This same Teledyne division also produces high purity electrolytic hydrogen generators that are used in many laboratory and industrial processes.

At the end of this list of industrial activities is the area of waste disposal. Teledyne engineers, produces and operates large scale solid waste systems for local municipalities, that efficiently recover useful metals and materials from rubbish while producing useful amounts of energy. Teledyne also provides services for the disposal of radioactive waste, as well.

Specialty Metals

Teledyne specialty metals and alloys are used in industrial, aerospace and nuclear applications.

Basic to the production of virtually every modern metal product are Teledyne's high speed steels which provide the high temperature hardness required for lathe bits, drills, milling cutters, taps and dies and other cutting tools. Related alloy steels are produced for bearings, gears and special aerospace hardware.

Parallel to high speed steels is Teledyne's line of sintered tungsten carbide products, made by combining carbon, tungsten and various other metals under heat to produce a material that approaches the diamond in hardness, at far lower cost. It is vital for super hard cutters used in the high speed machining and cutting of steel and many other materials.

Among other metals produced by Teledyne are superalloys, engineered to retain their high tensile strength at temperatures approaching 2000° Fahrenheit, for use in jet engine turbine parts which operate under tremendous centrifugal forces at temperatures that would melt ordinary steels.

Teledyne also produces tungsten, a unique metal that is the most heat resistant of all metals and is more than one-and-one-half times as dense as lead. Teledyne mines tungsten ore and produces both pure tungsten powder and tungsten carbide powder as well as finished tungsten mill products. It is used in diverse applications ranging from light bulb filaments and electrical contacts to radiation shielding and aircraft counterweights.

Molybdenum, a sister metal to tungsten produced by Teledyne, also has a very high melting point. It is an important alloying element for steels and is used for plasma arc spraying of piston rings and for electrodes in glass melting furnaces.

In the area of more exotic metals, Teledyne produces columbium, also known as niobium, which retains its ductility at both high temperatures and low cryogenic temperatures. It is used for rocket nozzles, and, combined with other metals, is a prime ingredient of superconducting alloys.

At the opposite end of the scale from tungsten is titanium, valued for its lightweight strength. Teledyne produces titanium in ingot, billet and coil for a variety of aerospace uses.

Teledyne is the leading U.S. producer of zirconium, a highly corrosion-resistant metal that is transparent to neutrons. It is used for fuel tubes and structural parts in nuclear reactors, in the form of foil in flash cubes, and for corrosion-resistant chemical industry equipment. Hafnium, derived as a by-product of zirconium, is used for control rods in nuclear reactors.

Teledyne also processes metals into a variety of finished forms. Over 60 different metals and alloys, for example, are rolled into ultrathin sheet and foil that is used for applications ranging from watch springs and flash bulbs to aerospace honeycomb materials.

Teledyne also casts a variety of metals into forms ranging from 90-ton steel mill rolls to lightweight aluminum and magnesium aircraft parts. High pressure pipe for the chemical industry is made by centrifugal casting, and a variety of housings and parts are made for business machines, tools and automobiles by die casting methods. Cold-finished bar and shafting and cold-drawn seamless and welded tubing are also produced.

Other Teledyne companies are involved in roll-forming metals, forging heavy parts for construction and earth moving machinery and precision investment casting of difficult to produce parts.

Aviation and Electronics

Products in the closely related fields of aviation and electronics range from the microscopic world of semiconductor devices to full-scale air frames and complete aircraft.

At the small end of the scale are Teledyne's basic semiconductor building blocks. These include transistors, diodes and integrated circuits. A step up from these tiny components are hybrid microcircuits the size of postage stamps, including a complete microcomputer that contains 72,000 active elements on a ceramic base the size of a soda cracker. In the two Viking missions to Mars, over twenty-seven hundred Teledyne hybrid microcircuits of various types were used.

On a still larger scale are Teledyne's high power traveling wave tubes, used to simultaneously transmit thousands of telephone conversations—or a dozen television channels—around the world via satellite networks.

Other components include operational amplifiers, digital-analog converters, miniature relays, radar augmentors, low power microwave tubes, flexible printed-circuit interconnections, high reliability wire and cable, switches, terminals and a line of aircraft batteries.

At the systems level, Teledyne produces equipment for telemetering data from remote sources, for electronic countermeasures, and for information processing, as well as the AIDS aircraft integrated data systems used by dozens of major airlines to record in-flight performance and maintenance data on their jumbo jets.

Computing and inertial systems are also produced for the control and guidance of aircraft and space vehicles. Teledyne on-board computers have successfully controlled the launching of dozens of spacecraft, including both Viking missions to Mars.

Teledyne is heavily involved in electronic navigation systems, as well, with Loran and Omega navigators for long range sea and air navigation, and Raydist systems for precise radiolocation in coastal waters. Doppler radar systems produced by Teledyne were used on 24 successful

space landings, and guided each Apollo lander to the surface of the moon. Similar Doppler radars are used in military aircraft for antisubmarine warfare and search-and-rescue missions.

Teledyne avionic instruments and electronic systems contribute substantially to flight safety in both military and general aviation aircraft.

Among Teledyne's many non-electronic products for aviation are controlled explosive devices that precisely time, sequence and actuate aircraft escape systems, and similar pyrotechnic devices used to separate the stages of space vehicles, and to eject or deploy instrument packages of many kinds. Teledyne also produces parachute delivery systems for accurate air-drop of military cargo or emergency supplies.

Precise hydraulic and pneumatic actuating systems and components are made for both fixed and rotary wing aircraft, as are ground support systems such as frequency and power converters and jet engine starters for commercial and general aviation use.

Continental piston engines have been powering airplanes for sixty years, and today about half of the general aviation piston engines produced in the United States are built by Teledyne and used worldwide. Teledyne turbine engines also power remotely-piloted aircraft, military trainers and, in small, expendable versions, provide power for the Harpoon cruise missile.

The company's expertise in airframe manufacture goes back to Charles Lindberg's Spirit of St. Louis which was built by Ryan Aviation, forerunner of today's Teledyne Ryan Aeronautical. More than twenty-five types of remotely-piloted aircraft — usually called RPV's — have been built by Teledyne, in both supersonic and subsonic versions. These recoverable and reusable vehicles are used for sophisticated military missions with the pilots safely flying them from remote control centers. Teledyne is also building the airframe for the new Army attack helicopter and has produced thousands of feet of tapered, roll-formed stringers used in the Boeing 747 and Douglas DC-10 airframes.

Through the production of sophisticated RPV's Teledyne has also developed broad expertise in the use of advanced materials such as graphite composites, and has facilities for the numerically-controlled machining of airfoils from honeycomb materials.

Teledyne's participation in all these diverse areas of aviation, space and electronics has given the company highly developed expertise in some of the most advanced technologies of our time.

Consumer

Consumer products are a growing and important part of the company's business.

Teledyne's best known consumer products are sold under the brand name Water Pik. The original product in this line was the Water Pik Oral Hygiene Appliance, a device used to cleanse the teeth and gums with a pressurized jet of water. This product has been combined with an electric toothbrush to form a complete family oral hygiene center.

Another major Water Pik product is the Shower Massage, a showerhead that can deliver a conventional spray or a refreshing jet massage. The company also manufactures several other personal care and home use products for the consumer.

Teledyne is also well known throughout the world for its line of acoustic suspension high fidelity speakers marketed under the AR brand name.

In addition to manufacturing home entertainment products, Teledyne also operates a chain of retail stores in the United States that sell electrical and electronic components, tools, hobbyist supplies and a diverse range of home audio, stereo and video equipment. Some are sold under the private brand names of Teledyne and Olson, and the company also markets by mail order. Servicing and repair of electronic home entertainment products is also carried out through California service centers.

In an entirely different consumer area are Teledyne Laars swimming pool heaters, and a related line of equipment for heating buildings and supplying hot water for commercial and industrial use.

Teledyne also makes materials and equipment for dentists and dental laboratories. Among these are dental cements, impression compounds, high-speed turbine operated dental handpieces, diamond drilling burs and articulators.

Other miscellaneous products often sold directly to consumers include battery powered lamps, lanterns and emergency lighting equipment, engineering drafting supplies for professional and school use, diazo copying machines, and plastic cups and containers.

Insurance & Finance

Teledyne's casualty insurance companies write a broad line of insurance including workers' compensation, liability, automobile, homeowners, and fire insurance.

Unicoa Corporation, 95% owned by Teledyne, writes life and health and accident insurance. Fireside Thrift, a consumer finance company, operates in the state of California.

Business Segments

Information on the Company's business segments for each of the five years ended December 31, 1979 is as follows:

	(000's omitted)				
Revenues:	*1979*	*1978*	*1977*	*1976*	*1975*
Industrial	$ 936,356	$ 914,615	$ 814,450	$ 701,816	$ 613,347
Specialty metals	841,246	698,028	600,828	508,255	455,003
Aviation and electronics	642,617	539,102	491,096	453,383	460,255
Consumer	285,381	289,884	303,357	274,102	186,367
Consolidated sales	2,705,600	2,441,629	2,209,731	1,937,556	1,714,972
Insurance and finance	879,726	779,127	750,706	703,670	758,003
Total	$3,585,326	$3,220,756	$2,960,437	$2,641,226	$2,472,975
Income of consolidated companies before income taxes:					
Industrial	$ 148,148	$ 150,347	$ 134,399	$ 98,385	$ 80,305
Specialty metals	135,223	115,685	81,872	69,789	37,557
Aviation and electronics	83,340	72,652	67,994	57,268	41,898
Consumer	40,715	32,062	49,538	45,179	28,810
Total operating profit	407,426	370,746	333,803	270,621	188,570
Corporate expenses	16,495	14,109	16,812	24,840	8,786
Interest expense	12,505	15,843	16,990	18,756	22,254
Interest and dividend income	(22,689)	(16,756)	(11,636)	(9,230)	(10,389)
Total	$ 401,115	$ 357,550	$ 311,637	$ 236,255	$ 167,919
Equity in net income of unconsolidated subsidiaries:					
Equity in net income of:					
Life insurance companies	$ 66,584	$ 31,525	$ 23,739	$ 20,634	$ 11,178
Casualty insurance companies	132,562	46,163	8,974	(10,315)	(4,318)
	199,146	77,688	32,713	10,319	6,860
Allocated interest expense	(14,924)	(12,921)	(12,964)	(12,504)	(12,726)
Income tax items	(19,577)	7,786	23,197	25,729	24,953
Total	$ 164,645	$ 72,553	$ 42,946	$ 23,544	$ 19,087

Additional information on the Company's business segments for each of the three years ended December 31, 1979 is as follows:

	(000's omitted)		
Depreciation and amortization expense:	*1979*	*1978*	*1977*
Industrial	$ 33,748	$ 27,618	$ 20,300
Specialty metals	17,086	15,251	14,322
Aviation and electronics	11,412	9,887	9,179
Consumer	2,769	2,669	2,796
General corporate	2,393	1,811	1,642
Total	$ 67,408	$ 57,236	$ 48,239
Identifiable assets:			
Industrial	$ 323,996	$ 319,618	$ 265,601
Specialty metals	259,279	225,560	209,342
Aviation and electronics	152,427	145,064	125,042
Consumer	81,972	80,165	99,874
	817,674	770,407	699,859
General corporate assets	273,039	268,353	288,142
Investments in unconsolidated subsidiaries:			
Life insurance companies	395,210	291,170	254,369
Casualty insurance companies	541,274	236,738	188,105
Total	$2,027,197	$1,566,668	$1,430,475
Capital expenditures:			
Industrial	$ 45,582	$ 65,393	$ 28,410
Specialty metals	22,215	17,212	16,927
Aviation and electronics	16,976	14,226	8,847
Consumer	2,922	1,794	4,085
General corporate	4,826	3,394	2,135
Total	$ 92,521	$ 102,019	$ 60,404

Supplemental Information on Inflation Accounting

The following unaudited information on the Company's financial data adjusted for general inflation is presented in accordance with the provisions of Statement of Financial Accounting Standards No. 33.
(000's omitted except per share amounts and average consumer price index)

	1979	*1978*	*1977*	*1976*	*1975*
Consolidated sales:					
As reported	$2,705,600	$2,441,629	$2,209,731	$1,937,556	$1,714,972
As adjusted	$2,705,600	$2,716,531	$2,646,807	$2,470,526	$2,312,872
Market price per common share at end of year:					
As reported, adjusted for stock dividends	$134	$89¼	$52	$56½	$17½
As adjusted	$127⅛	$95⅝	$60⅝	$70½	$22⅞
Average consumer price index	217.4	195.4	181.5	170.5	161.2

Additional information on the Company's 1979 financial data adjusted for general inflation is as follows:

Net income as reported	$ 371,960	Net income per share:	
		As reported	$ 27.59
Adjustments to restate for general inflation:		As adjusted	$ 24.66
Cost of sales	(38,997)		
Depreciation and amortization expense	(566)	Net assets at end of year:	
		As reported	$1,275,406
Net income adjusted for general inflation	$ 332,397	As adjusted	$1,553,298
		Gain from decline in purchasing power of net monetary liabilities	$ 21,422

The adjusted information above is presented in average 1979 dollars. Such constant dollar accounting is a method of adjusting for general inflation by reporting financial data in dollars which have the same purchasing power. The index used to prepare the constant dollar information is the Consumer Price Index for All Urban Consumers, published by the Bureau of Labor Statistics of the U.S. Department of Labor.

The effects of changing prices on net income, as computed by constant dollar accounting, is applied to only property and equipment and inventories, those items most often affected by inflation. The adjustment for general inflation is most significant to the historical cost of fixed assets and the related depreciation expense, since fixed assets are purchased over an extended period of time and remain at original cost in the balance

sheet. Depreciation expense allocates, on a ratable basis, a portion of the historical cost stated in dollars having varying amounts of purchasing power. The 1979 depreciation on a constant dollar basis was $87,630, compared with the actual expense of $67,408 included in the consolidated financial statements. Of this $20,222 difference, $19,656 is included in the adjustment to cost of sales presented above. The adjusted depreciation was computed using the same methods and rates as used in the historical financial statements.

A similar relationship exists with respect to cost of sales, but is less significant since inventories are acquired only months prior to their sale, and because the Company uses the last-in, first-out method of valuation for a significant portion of its inventories.

Income tax expense has not been adjusted since the increased cost of sales and depreciation and amortization expense would not be deductible for income tax purposes.

Adjusted net assets at the end of the year were determined by considering the effects of general inflation on inventories and property and equipment and by adjusting the net monetary liabilities included in the end of year net assets to average 1979 dollars. The adjustment to property and equipment increased net assets for the reasons discussed above. The impact on adjusted net assets of the adjustment to inventories was more significant than the related adjustment to cost of sales because of the use of the last-in, first-out method of valuing inventories referred to above.

During a period of inflation, the holding of monetary liabilities results in a gain in general purchasing power. The gain in purchasing power is shown separately in the table above. The amount was determined by comparing the change in net monetary liabilities actually reported in 1979 with the change in net monetary liabilities in 1979 as measured in constant dollars. This gain, however, does not represent any funds that are available for use by the Company.

The difference between the market price per common share as reported and as adjusted results from adjusting the end of year price to average 1979 dollars.

Common Stock Price and Dividend Summary

	1978				*1979*			
Quarters	*1st*	*2nd*	*3rd*	*4th*	*1st*	*2nd*	*3rd*	*4th*
High	63⅞	110⅜	106⅞	101	128¼	137	154½	150¼
Low	48	61⅛	87½	76⅝	88¾	113½	129⅜	117½
Dividend	10% Stock Paid in June				8.5% Stock Paid in April			

Prices have been adjusted for common stock dividends paid through April 6, 1979. Teledyne Common Stock is listed on the New York and Pacific Stock Exchanges.

Historical Summary

	Consolidated Sales	Net Income	Net Income Per Share	Consolidated Assets	Shareholders' Equity	Average Common Shares
1979	$2,705,600,000	$371,960,000	$27.59	$2,027,197,000	$1,275,406,000	13,481,630
1978	2,441,629,000	248,503,000	17.63	1,566,668,000	875,357,000	14,067,879
1977	2,209,731,000	194,783,000	13.65	1,430,475,000	693,193,000	14,140,946
1976	1,937,556,000	136,799,000	8.90	1,225,667,000	513,606,000	15,141,693
1975	1,714,972,000	101,706,000	4.81	1,136,511,000	489,341,000	20,671,549
1974	1,699,987,000	31,505,000	1.03	1,108,913,000	477,793,000	28,372,395
1973	1,455,499,000	65,983,000	1.89	1,227,408,000	532,815,000	33,742,483
1972	1,215,991,000	59,285,000	1.25	1,127,809,000	483,960,000	45,761,069
1971	1,101,872,000	57,425,000	1.17	1,064,772,000	606,118,000	47,374,598
1970	1,216,448,000	61,864,000	1.29	952,607,000	576,349,000	46,379,014
1969	1,294,775,000	58,119,000	1.28	938,133,000	501,961,000	44,636,316
1968	806,747,000	40,289,000	1.04	602,428,000	316,469,000	38,827,214
1967	451,060,000	21,256,000	0.72	336,714,000	152,603,000	30,367,356
1966	256,751,000	12,035,000	0.54	170,369,000	90,205,000	22,414,982
1965	86,504,000	3,402,000	0.30	66,544,000	34,765,000	11,269,782
1964	38,187,000	1,441,000	0.20	35,040,000	13,672,000	7,001,020
1963	31,925,000	731,000	0.11	23,901,000	8,629,000	5,735,028
1962	10,438,000	157,000	0.03	10,844,000	3,527,000	4,544,035
1961	4,491,000	58,000	0.02	3,731,000	2,477,000	3,400,045

As reported in the Company's annual reports, adjusted for dividends and stock splits. 1976 and 1977 were restated to reflect equity accounting. Years 1967 through 1978 were restated for certain accounting changes. Average common shares include common stock equivalents.

TELEDYNE, INC.

Corporate Offices

1901 Avenue of the Stars

Los Angeles, California 90067

Transfer Agents

Bank of America N.T. & S.A.

Corporate Agency Service Center

P.O. Box 37002

San Francisco, California 94137

United States Trust Company of New York

130 John Street

New York, New York 10038

Registrars

Security Pacific National Bank

Box 7762, Rincon Annex

San Francisco, California 94120

Citibank, N.A.

111 Wall Street

New York, New York 10043

This Teledyne Report deals with energy—the most basic of our earth resources. A great many Teledyne companies are directly involved in finding, developing, extracting, converting, distributing and utilizing energy in its many forms. Other Teledyne companies supply materials, products and services that are vital to these energy oriented pursuits. This issue is a survey of those activities—many reported in detail in earlier Teledyne Reports—that shows Teledyne's deep involvement in the issues that will be of paramount importance in the eighties and beyond.

Teledyne Report featuring subjects of particular interest from Teledyne activities is issued on a quarterly basis. Previous topics include:

Radar:
Sensing the Unseeable.

Fluid Power:
Muscle for machines.

Pipeline Controls:
Operating petroleum pipelines.

The Aerospace Metals:
Superalloys and titanium.

Screw Threading:
Machine tools for industry.

Urban Waste:
Recovering energy and materials.

Aerial mapping:
Applying advanced digital techniques.

The Water Pik Story:
Innovative consumer product designs.

Dental Health:
Instruments, supplies and equipment for the dentist.

Space Navigation:
Computers that guide space launches.

Analytical Instruments:
Chemical detection for industry.

1776-1976:
Technology then and now.

Life Insurance:
Financial security and investment capital.

The Refractory Twins:
Producing tungsten and molybdenum.

The Instrument Makers:
Surveying instruments and optical encoders.

Industrial Engines:
Developments in small piston engines.

Job Corps:
Teaching young people marketable skills.

Friendly Explosives:
Aircraft emergency escape systems.

Microelectronic Hybrids:
The step beyond integrated circuits.

The Energy Options:
Nuclear fuel versus coal.

Workman's Compensation:
Extending the coverage.

Drilling for Offshore Oil:
Getting the oil out.

The Search for Oil:
Finding new oil deposits.

High Speed Steels:
Premium alloys for machine tools.

Energy Crisis in the Computer Room:
Controlling power quality.

Raydist:
Super-precise radiolocation system.

Welding:
Advanced alloys for joining metals.

General Aviation Engines:
Piston power for aircraft.

Rubber:
Diverse products for automobiles and industry.

Loran:
Improved all-weather navigation system.

Seismology:
Instruments for understanding earthquakes.

Casting:
Precision production of metal parts.

AIDS:
Monitoring commercial aircraft performance.

Thermoelectrics:
Direct conversion of heat to electricity.

Thin Metals:
How they are made and used by industry.

The Reproduction of Music:
Speakers for high fidelity sound.

The Crowded Spectrum:
Technology of microwave traveling wave tubes.

Science and Cinematography:
Motion pictures for scientific analysis.

Superalloys:
High temperature metals for the space age.

TELEDYNE, INC.